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ABSTRACT

This instructor's manual is designed for use by an experienced cyclist to teach a 10-week, 30-hour course. The course provides on-bike and classroom instruction in defensive maneuvers in traffic, long-distance riding, health and physiology, bike maintenance, legal considerations of biking, and route selection. Participants should be at least occasional riders who can ride with reasonable competence and confidence; instructors may establish additional prerequisites. Section I provides general information for potential sponsors, including a course description, logistics, and outline. Section II discusses instructional strategies for classroom and on-bike instruction. Section III contains outlines for the 10 classes and student handouts. The outlines include factual material and informative diagrams. Each class covers a variety of topics, including basic skills of riding; riding on uncrowded streets; riding in moderate and heavy traffic; emergency maneuvers; touring; bike selection and fit; equipment, brakes, basic posture and pedaling techniques; laws; wheels; bicycle accidents; safety hints; intersections; tires; changers; conditioning; gears and gearing; commuting; bicycle security; chain and freewheel; headset and stem; racing; bottom bracket; bike facilities; and bike carriers. Appendixes include listings of bicycle clubs and organizations, lists of sources for each class, and a bibliography. (YLB)

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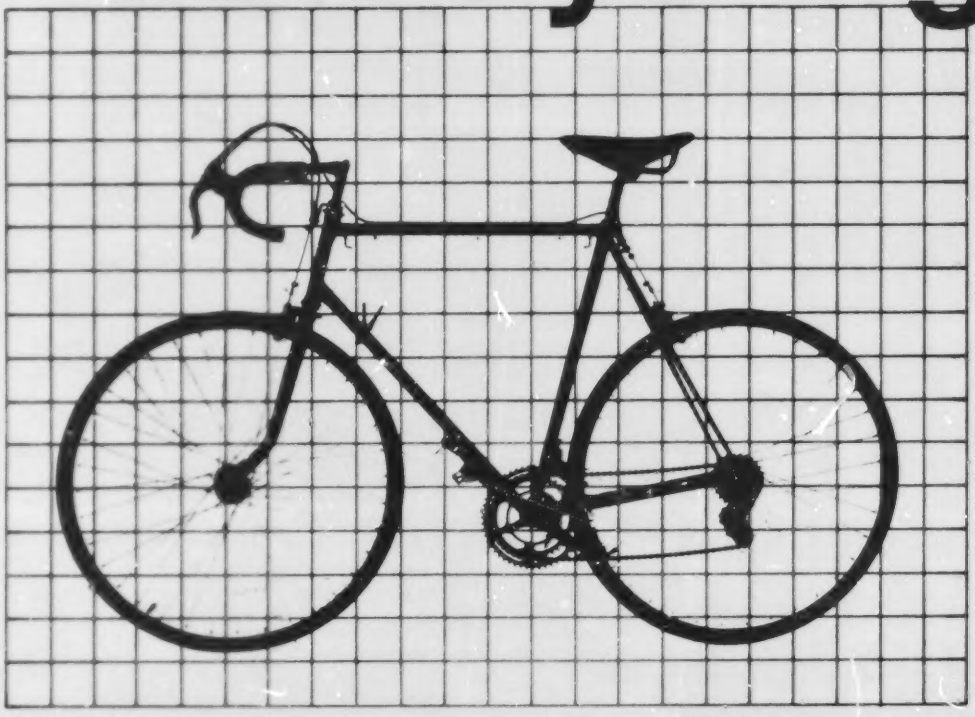

An Instructor's Manual

CE 04620

Bicycle Program

CENTER FOR URBAN AFFAIRS AND COMMUNITY SERVICES
NORTH CAROLINA STATE UNIVERSITY
RALEIGH, NORTH CAROLINA
1978

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PREPARED FOR
THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION BICYCLE PROGRAM
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CENTER FOR URBAN AFFAIRS AND COMMUNITY SERVICES

The Center for Urban Affairs and Community Services was established in 1966 on the campus of North Carolina State University in Raleigh as a part of the Urban Studies Program of the University of North Carolina. The Center's goal is to serve as a focal point for bringing the research, educational, and extension resources of NCSU to bear upon community problems associated with urbanization in North Carolina.

ADDITIONAL INFORMATION

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PREFACE

This course was developed by the North Carolina State University Center for Urban Affairs and Community Services and the North Carolina Department of Transportation's Bicycle Program under a grant from the North Carolina Governor's Highway Safety Program. The course is designed to provide on-bike and classroom instruction in all aspects of cycling including defensive maneuvers in traffic, long-distance riding, health and physiology, bike maintenance, and route selection. Hopefully, the course can be used by many agencies or organizations across North Carolina to promote safe and effective cycling.

ACKNOWLEDGEMENTS

The authors are grateful to the members of the Bicycling Advisory Committee composed of ten of North Carolina's leading cyclists. Their continual comments and review have shaped the program. This committee provided a broad range of expertise and reviewed all course materials for accuracy and appropriateness. Members of this committee were:

Bill Flournoy	Raleigh
Ed Gaddy	Raleigh
Bill Humphreys	Chapel Hill
Chuck Lewis	Efland
Gary D. Martin	Rocky Mount
Mel Murray	Winston-Salem
Bob Ramsey	Raleigh
Peter Scheffler	Greensboro
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Vince Zucchino	Raleigh

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Administrative support for this document was provided by Paula Taylor, Sandra Mills, Bonnie Denkins, and Thelma Hunter. Barbara Benson served as Technical Editor. Cover design and all illustrations were produced by Steve Pavlovic. The authors are grateful to all of these people for their important contributions to the project.

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I. General Information for Potential Sponsors

Bicycles are useful and efficient transportation vehicles as well as recreational instruments which promote the health of their riders. Douglas Smith suggests the following advantages of bicycles as transportation and recreational vehicles:

-transportation is responsible for 25% of energy consumption in the United States; 95% of such energy is petroleum derived.

-211 million Americans, for the sole purpose of transportation, use more energy than 1.3 billion Chinese and Indians use for all purposes combined.

-80% of all automobile traffic is within eight miles of the home.

-the bicycle, with its human rider, is the most energy efficient transportation device ever invented, more efficient than even the hydrodynamics of the dolphin.

-the bicycle, a principal mode of transportation in numerous cities throughout the world, permits swifter traffic flow than the automobile. Bicycles and pedicabs in Bangkok and Hong Kong move more quickly than buses and cars do in New York or Boston.

-bicycles provide unequalled door-to-door convenience and need no elaborate support facilities.

-bicycles occupy little space: 18 bicycles can be parked in the space occupied by one automobile; 30 bicycles can travel in the space required by one moving automobile.

-bicycles are cheaper to manufacture and cheaper to operate than any other vehicle, with no concommitant costs in damage to environmental quality.

-bicycles provide unequalled opportunity for improved physical fitness and health. (Heart specialist Paul Dudley White recommended the bicycle as an excellect therapeutic device.)

-and if speed is still the thing, we should note that racers have achieved 127 MPH velocities...and some bicycles have become airborne....[1]

[1] Douglas B. Smith, "A Few 'Pedalogical' Redefinitions" in Cyclateral Thinking, (Summer 1976), pp. 22-23.

Small wonder that bicycling is on the rise today. However, this rise in the use of bicycles is not without problems. Many people who are now venturing onto streets and roads know how to ride a bicycle in an empty parking lot, but they do not know how to ride safely in traffic. Riding safely in traffic requires not only balance and coordination, but also knowledge of the rules of the road, awareness of potential hazards, and knowledge of defensive maneuvers which can be used to avoid these hazards. This course will provide additional training for adult cyclists in these areas. In other words, this course is designed to teach people how to operate a bicycle safely and comfortably for whatever use they desire in whatever weather, traffic, or road conditions they may encounter.

A. Course Description

This instructor's manual has been designed for use by an experienced cyclist to teach a ten-week, thirty-hour course. About one-half of this time should be on-bike instruction. Hopefully, the course contents can easily be adapted to fit other class schedules or uses.

The course is designed to provide on-bike and classroom instruction in defensive maneuvers in traffic, long-distance riding, health and physiology, bike maintenance, legal considerations of biking, and route selection. The course is not designed to teach beginners to balance on a bicycle. Rather, participants should already be at least occasional riders who can ride with reasonable competence and confidence. Some instructors may wish to establish additional prerequisites such as minimum weekly distances ridden. Of course, participants must each have a bicycle, preferably one with multiple gears. Again, instructors may wish to change requirements of their own course. Participants will also need to have access to certain basic tools in order to complete the bike maintenance portion of this course. See page 28 for suggested tool list.

No textbook is required for this course because this manual has been written to include factual material and informative diagrams. The instructor may wish to duplicate and distribute some of these materials and diagrams to class members. Throughout this guide, references have been indicated. Instructors who desire more information on a particular topic should consult these references. Since they may not be readily available, sets of reference materials to use in conjunction with this course are available on loan from the North Carolina Department of Transportation Bicycle Program. To borrow a set of materials, simply call or write:

North Carolina Department of Transportation
Bicycle Program
P. O. Box 25201
Raleigh, North Carolina 27611 (919) 733-2804

The course has been designed to include a variety of topics in each class period. The success of such a design depends on the instructor's competence in all areas of course content. Some instructors may prefer

to call upon local experts to conduct certain segments of a course. Having guest speakers may require some rearrangement of topics. For example, if a local bike shop owner agreed to conduct the maintenance portion of the course, it would be advisable to change the course outline so he/she would only need to come to one or two classes instead of doing a small portion of ten classes.

B. Course Logistics

1. Course Sponsorship

The North Carolina Department of Transportation has produced this instructor's guide to promote instruction in adult cycling throughout the state. An adult cycling course could be sponsored by numerous public agencies such as universities, community colleges, law enforcement agencies, parks and recreation departments, or by civic organizations, or even by individuals. No matter who the course sponsor is, broad-based community support will help ensure a successful program. Efforts should be made to involve representatives of as many of these agencies as possible in planning and preparation for this course. The North Carolina Department of Transportation Bicycle Program will also support efforts to initiate this course in any way possible.

Sponsoring groups or individuals must make all arrangements for the course, including the hiring of an instructor, selection of a classroom site, and registration of students. One of the first decisions a sponsor must make is whether or not a registration fee will be charged for the course. Hopefully, some sponsors will be able to offer this course as a public service at no charge to the registrants. Other sponsors will need to charge minimal registration fees to cover the costs involved. In order to decide on fees, sponsors should estimate the cost of conducting the course including such things as the instructor's salary, facility rental, and duplication expenses.

2. Site Selection

When sponsorship has been established, investigation into finding an appropriate site for the course should begin immediately. Many sponsors may have access to appropriate sites such as schools, recreation department facilities, or civic meeting halls. Important factors to be considered in selecting an appropriate site include:

1) Adequate classroom facilities including blackboard and screen are required. The classroom must be large enough for all students and instructors to work on their bikes.

2) The classroom site must be easily accessible by bicycle so that students will be encouraged to ride to class.

3) There must be a large empty parking lot or street with a very low volume of traffic near the meeting place. The instructor can demonstrate maneuvers and students can practice in this area.

4) To keep the cost at a minimum, the facilities should be free or low-cost.

3. Selection of Instructor

Once the sponsor has selected a site, a competent instructor must be found. It is imperative that the instructor be a skilled cyclist since he/she will be leading on-bike instructional sessions as well as providing in-class instruction. An instructor who is less than expert could endanger the lives of the students by teaching improper or unsafe techniques. Although this manual provides a minimal amount of information and handouts, the instructor must have a thorough knowledge of a wide range of topics including safety, maintenance, basic skills, defensive maneuvers, touring, and racing.

Ideally, the person selected will also have had teaching experience of some kind as well as experience leading groups of cyclists. The instructor should be a biker par excellence who not only has the knowledge and skills and enthusiasm for biking, but also has the ability to pass these along to his/her students.

Some readers may have just the person in mind--someone who has been waiting years for just this opportunity. Other readers may be ready to give up before they begin their search. Do not get discouraged. Contact any bike clubs in the area (see Appendix B), local bike shop owners, or the Department of Transportation Bicycle Program for suggestions of individuals in the area. Advertise in newspapers or bike club publications. Keep in mind that the qualifications listed are for the ideal instructor. If such a person does not appear, certain compromises may be possible. If a potential instructor lacks expertise in one area (for example, racing), perhaps a guest speaker can be brought in to cover this section of the course. Do not, however, compromise on the skill of the cyclist!

4. Class Scheduling

The course has been designed to be completed in ten three-hour sessions which meet once a week. Scheduling changes may be necessary to meet the needs of the target group or the sponsors. Classes should be

scheduled so that students have adequate time to practice the skills learned in one session before proceeding to more advanced skills. The on-bike instructional aspect of this course leads to several special scheduling considerations. First of all, the course should be taught in the spring, summer, or fall when the weather is more conducive to cycling. Certainly, it is possible to teach the course in the winter months. However, the weather conditions may discourage attendance or prejudice those who do attend against winter cycling.

Time of day for conducting the course will depend on the target group for the course. If the target group is working adults, then after-work hours or Saturdays are most appropriate. For other groups, afternoons may be best. Another important consideration in determining class time is the daylight available for riding. Since approximately one-half of each class is on-bike instruction, the course should be scheduled during daylight hours. It is best to avoid scheduling on-bike instruction during early morning or late evening hours when sun glare is at its worst. Sun glare blinds motorists as well as cyclists and creates additional hazards.

5. Students

Once the sponsors, site, instructor, and class schedule have been arranged, the students must be found. The sponsors and the instructor should agree upon a maximum enrollment. We recommend that no more than twenty students be accepted. A class of this size will be difficult for even a skilled instructor to handle properly during on-bike instructional sessions; however, it is assumed that in each class there will be at least one or two skilled riders who can assist the instructor. Some sponsors may also wish to set a minimum enrollment if costs are being paid out of registration fees.

Publicity is essential to attract students. Advertisement for the course can take many forms. If the course is being taught in conjunction with a school, college, or recreational program, normal course listings and bulletins can be used. The course could also be advertised in newspapers or club newsletters, on radio and television public affairs spots, through local bike clubs, and at local bike shops.

The sponsor and instructor must also decide what student prerequisites will be required. We suggest that participants should be at least occasional riders, should provide their own bicycles in rideable condition, and should have access to certain basic tools necessary for bike maintenance. Instructors may wish to add additional conditioning requirements or restrictions on acceptable types of bicycles. If handicapped students apply, the instructor must make a judgment based on the student's ability to complete the course without endangering himself or other members of the class.

C. Course Outline

Class I

- Course Introduction
- Only One Road
- Bike Selection and Fit
- Equipment
- Ride - Basic Skills

Class II

- Ride - Bike Rodeo
- Brakes
- Basic Posture and Pedaling Techniques
- Laws Affecting Cyclists

Class III

- Ride - Uncrowded Streets
- Wheels
- Bicycle Accidents
- Safety Hints
- Intersections

Class IV

- Ride - Moderate Traffic
- Tires
- Dangerous Road Conditions

Class V

- Ride - Heavy Traffic
- Changers
- Conditioning

Class VI

- Ride - Emergency Maneuvers
- Gears and Gearing
- Commuting
- Bicycle Security

Class VII

- Ride - Hills
- Introduction to Touring
- Club Cycling
- Chain and Freewheel

Class VIII

- Ride - Touring
- Headset and Stem
- Introduction to Racing

Class IX

Ride - Time Trials
Bottom Bracket
Bike Facilities
Bike Carriers
Dogs and Cyclists

Class X

II. Instructional Strategies

Cycling, whether for recreation, for transportation, for physical fitness, or for competition, is an active undertaking. This course is based on the thesis that to learn the art of cycling, a person must bicycle. Although there is no substitute for experience, this course is an attempt to shorten the length of time needed to become a skilled cyclist by providing hints from experienced cyclists. Throughout this course, lecture, demonstration, and practice are combined to produce a stimulating educational experience.

As the instructor, you should be conscious of keeping up the enthusiasm and interest of the class. Be sure to take time to express the pleasures of cycling!

A. Classroom Instruction

Classroom instruction represents approximately one-half of this course. A great deal of information should be presented during classroom sessions. In order to cover the materials in this manual properly, it is important that you prepare carefully for each class. Preparation should include studying the lesson plan, gathering necessary tools and materials for demonstrations, practicing demonstrations, and reproducing student handouts.

Have students prepare for each class by studying handouts reproduced from the manual. Class demonstrations or discussions will be more effective if students have prepared ahead of time. Give students the handouts that will be covered in the next class, so that they can read them prior to the class.

Class sessions are for providing information to students. Demonstrations and visual aids can be effective techniques to maintain interest level of students while presenting information. Do demonstrations slowly, pointing out one step at a time. Reinforce demonstrations with handouts. Have students repeat what has been demonstrated with their own bikes. Be sure to point out differences among bikes that may influence certain procedures, especially maintenance.

Students may ask questions which go beyond the scope of the information provided and beyond your knowledge. Use the set of references available from the Department of Transportation or other resources available to you to supplement your knowledge.

Use classroom sessions to prepare students for on-bike portions of the course. Explain what special skills will be practiced during the upcoming session. It will be easier to discuss these things with the whole group before getting on bikes.

B. On-Bike Instruction

On-bike instruction will certainly be the most important and the most enjoyable portion of this course, but it will also be the most difficult for you to handle well. A group of up to twenty students would be difficult to observe, instruct, and evaluate if all students were at the same level. The probable mix of students you will have will be even more difficult to handle. Certainly, there will be some cyclists who are more skilled than others. Take advantage of their skills by allowing them to lead for certain portions. It may be necessary to regroup the class according to skill levels to make instruction and evaluation easier.

Always demonstrate new techniques to the group before setting out. On the ride, carry on continual instruction by pointing out deficiencies in cycling technique, correct maneuvers by students, and unexpected hazards on the ride. Whenever a cyclists makes an unsafe maneuver, stop immediately and correct the mistake. Be sure to keep rides in line with students' abilities. Do not move on to more difficult conditions if students are not ready.

Remember that students will probably not be in as good shape physically as you are. Start slowly, working up to more demanding rides. Take frequent rest periods which can be used to discuss rides, maneuvers, or problems encountered.

III. Class Outlines and Handouts

A. Class I

1. Course Introduction

The first class meeting will be important to the success of the class. At this first meeting, the objectives of the course should be explained. Students also need to know the content of the course, how it will be conducted, and what will be expected of the[illegible] In order for students to maintain a high level of interest in this c[illegible] you must describe the course enthusiastically.

Course Objective

To teach people to operate a bicycle safely and comfortably for whatever use they desire in whatever weather, traffic, or road conditions they may encounter.

Course Content

Mention major topics to be included--basic skills, defensive maneuvers, maintenance, touring, racing, commuting, conditioning. Hand out course outline (pages 10-11).

Students may have additional areas that they would like to cover or may wish to concentrate on certain areas. Accommodate their requests to the extent that your skill and expertise and time will allow. However, do not omit any cycling basics. Time has been allowed for the instructor to add or expand upon areas of interest without omitting any basics.

Conduct of Course

Reemphasize that classroom and on-bike instruction will be combined. Explain that there will be a wide range of skill among students and that your aim is to help each student make significant improvement. Many students may have severe doubts about whether they are prepared to take

this course. In fact, many of the students may have good reason for their doubts. To help eliminate these doubts, explain that skills will be demonstrated and then practiced in class. Also explain that there will be time between classes for additional practice. Try to make students feel at ease in the course. After all, your goal is to improve students' cycling skills. That would be pretty hard to accomplish if they dropped out immediately because they were discouraged or lacked confidence.

Expectation of Students

Go over the prerequisites which are:

- The student must be able to ride a bike with reasonable competence and confidence.
- The student must have a bicycle (preferably multi-geared) which is in rideable condition.

Explain that they will need to acquire or have access to certain basic tools in order to maintain their bicycles. Tell them you will go over the list later.

Students will be expected to prepare for each class. They will be given handouts to read in preparation for each class. Also, they will be expected to spend some time practicing the skills learned in class. Students should also ride regularly to improve their endurance. In addition, they will be expected to maintain their bikes in good operating condition throughout the course. Emphasize that you are not conducting a bike maintenance clinic. You should stress that they are expected to learn how to maintain their bikes and to do it.

Give students an opportunity to ask any questions they may have about the conduct of the course. After questions have been answered, ask each student to complete an enrollment sheet (see page 17). By signing this sheet, they release you from any responsibility for accidents or injuries.

2. Only One Road

The film, Only One Road, produced by the American Automobile Association, provides an excellent introduction to an adult cycling course. The film is available on request from the N.C. Department of Transportation. It is included in the set of supplemental materials available from DOT. The

CYCLING Enrollment Card

I wish to enroll in the Cycling Course to be taught by_____
from _____to_____,
on a schedule of _____ for a fee of____

The instructor will teach Cycling in accordance with the curriculum developed by the NCSU Center for Urban Affairs and Community Services and the N. C. Department of Transportation's Bicycle Program. The instruction will include practice in traffic cycling, fast descents, fast maneuvering and emergency stops in order to develop the competence necessary for safe cycling. It will also include how to look after yourself and your bike, how to develop your physical speed and endurance (racing), and the enjoyment of cycling with a sociable group over pleasant roads (touring).

Students with medical problems which may be aggravated by exertion, or with hip, knee, or ankle problems, are advised to consult their physicians before intensifying their cycling.

The undersigned student recognizes that cycling is not an absolutely safe sport or transportation mode, and that accidents may occur despite all reasonable care on the part of both instructor and student. Both student and instructor hereby release each other, and any other sponsoring organization from claims resulting from cycling accidents during the class.

Name_____Telephone_____

Address: Street_____

City_____Zip_____

Age (if under 18) _____ Date_____

Signature_____Parent or Guardian if under 18_____

Fee paid, date

_____

_____

_____

Instructor's signature

_____

Instructor's name
Instructor's address

film may invoke some discussion or comments on the following points:

1. Problems involved with mixed bike/car traffic systems.
2. Confusion about rules of the road.
3. Lack of training for bike riders.
4. Five problem areas for cyclists:
   a. obstacles to flow
   b. left turns
   c. visibility
   d. right turns
   e. rules of the road

3. Bike Selection and Fit (handout - pages 22-23).

Bike Fit

Emphasize importance of proper bike fit. Demonstrate the three basic measurements for bike fit.

(1) You should be able to straddle the top tube (with an inch to spare) with both feet on the ground.

(2) Your knee should be slightly flexed when you are sitting on the saddle and the pedal is at its lowest point. The ball of your foot should be over the center of the pedal.

(3) With your elbow on the nose of the saddle, your fingertips should just touch the handlebars.

Help students check their bicycles for proper fit. Recommend corrective action where necessary.

Bike Selection

Some students may be considering purchasing a new bicycle immediately. Explain how to check bike alignment and brakes. Emphasize that they should test ride a bike before buying. Discuss the need to match bicycle to individual style of riding and use. (For example, 3-speed vs. 10-speed or touring vs. racing.)

4. Equipment

Bicycle

Point out parts of bicycle so that students can follow discussion of these parts. Hand out diagram and parts list (pages 24-25).

Demonstrate basic equipment checks (pages 26-27). Ask each student to perform these checks on his/her bike. Recheck each bicycle using Bicycle Inspection Check Chart (page 20). Make necessary repairs or recommend that student get repairs made in order to make the bike safe to operate. All necessary repairs should be made and all bicycles approved before the second class.

Tools

Explain that certain basic tools and supplies are necessary to properly maintain bike. Hand out List of Required Tools (page 28) and ask students to acquire these tools within the next two weeks.

Clothing

Discuss proper clothing for cycling. Bring in examples of clothing such as cycling shorts, jerseys, gloves, helmets, rain gear. Recommend clothing for class rides.

5. Ride--Basic Skill Check

The purpose of this ride is to size up the students and evaluate their skills. Before starting, demonstrate a straddle position. The ride should start very slowly, either in the parking lot or on a very quiet street. Check students for both proficiency and speed. Keep the students within a block if they are on the street. If on a street, you should lead at the start. Instruct students to ride about a foot from the right side of the road. These instructions will change as students become more skilled. Later, let a more proficient cyclist lead, but tell him where to stop and then drop back in the pack to observe all students. If any dangerous deficiencies are spotted, correct them at once. Watch each student for posture and bicycle adjustment. Keep the group close together and talk to the students to build confidence. Introduce the following basic maneuvers:

Starting

Straddle the bicycle. Backpedal until one pedal is forward and high. Step onto the high pedal, kicking off with the other foot. Place second foot on other pedal and pedal to increase speed. Ease yourself astride the saddle.

Instructor - BICYCLE INSPECTION CHECK CHART

	Need Repair	Approved
BRAKES: Check for smooth operation, worn pads, and pads hitting rim squarely		
CHAIN: Check for damaged links, snug fit; clean and lubricate		
WHEELS: Check for wobble, loose wheel nuts, broken spokes, or dented rims		
TIRES: Check air pressure, check for cuts or bubbles, remove foreign matter		
PEDALS. Check for lubrication and for loose bearings		
REAR REFLECTOR: Must be visible for 300 feet		
SADDLE: Check adjustment to body height		
HANDLE BARS: Check adjustment to body, check tightness and keep stem well down in front		
HANDLE GRIPS: Check worn grips and cement on tightly, check handlebar tape on ten-speeds		
TIRE VALVE: Inspect for leakage		
BRAKE CABLES: Check for fraying, check that cables slide freely in housing		
DERAILLEUR: Check adjustment to insure smooth changes to all gears		
TOOL KIT: Check to make sure all equipment is in working order		
PUMP: Check for compression and fitting valves		
BOTTOM BRACKET: Check for play		
HEADSET: Check for looseness		

NAME: BICYCLE TYPE: SERIAL NO.

ADDRESS & PHONE: DATE APPROVED:

Stopping

Apply brakes to slow down. With one pedal high and the other low, transfer your weight to the low pedal while sliding forward off the saddle and standing up. Take your foot off the high pedal and extend it toward the ground. Just before you stop, turn the wheel a little toward this foot to tip the bike towards it. The bike will stop going forward and will hit your right calf.

Braking

Initially, use both levers equally. Tighten both levers until you are slowing at the desired rate. If the rear wheel starts to skid, release both levers a little so that the skidding stops. Don't jam on the brakes too hard or you will go over the handlebars.

Gear Shifting

With derailleur gears, keep pedaling easily. Move shift lever until you hear a change; make slight adjustments until scraping disappears. Pedal hard enough to quit freewheeling. If derailleur is not shifted properly, it will rattle. If it rattles, move lever back and forth a little to properly seat the chain on the teeth. The noise will then cease.

With hub gears, stop pedaling and move lever to new position, then speed up pedaling.

Practice shifting on the level ground so that bicycle will keep rolling while you are learning to shift.

Student Handout: Bike Fit and Selection

In order to ride properly, your bike must fit you well. You should remember that comfort is not the only prerequisite to bike fit. In determining the bike fit, you must know "how to ride a bike" and how it should feel. A bicycle should fit your size, build, and style of riding. The more experience you have in riding, the easier it will become to determine what is best for you. If you are not an experienced rider, ask your local bike shop owner to help you select a bike that fits properly.

Make sure that you select a frame style that is appropriate for your style of riding. People who ride a bicycle only short distances should consider a three-speed (or possibly a one-speed if riding on flat terrain). Cyclists who plan to ride relatively long distances may need to invest in a ten- or fifteen-speed bicycle.

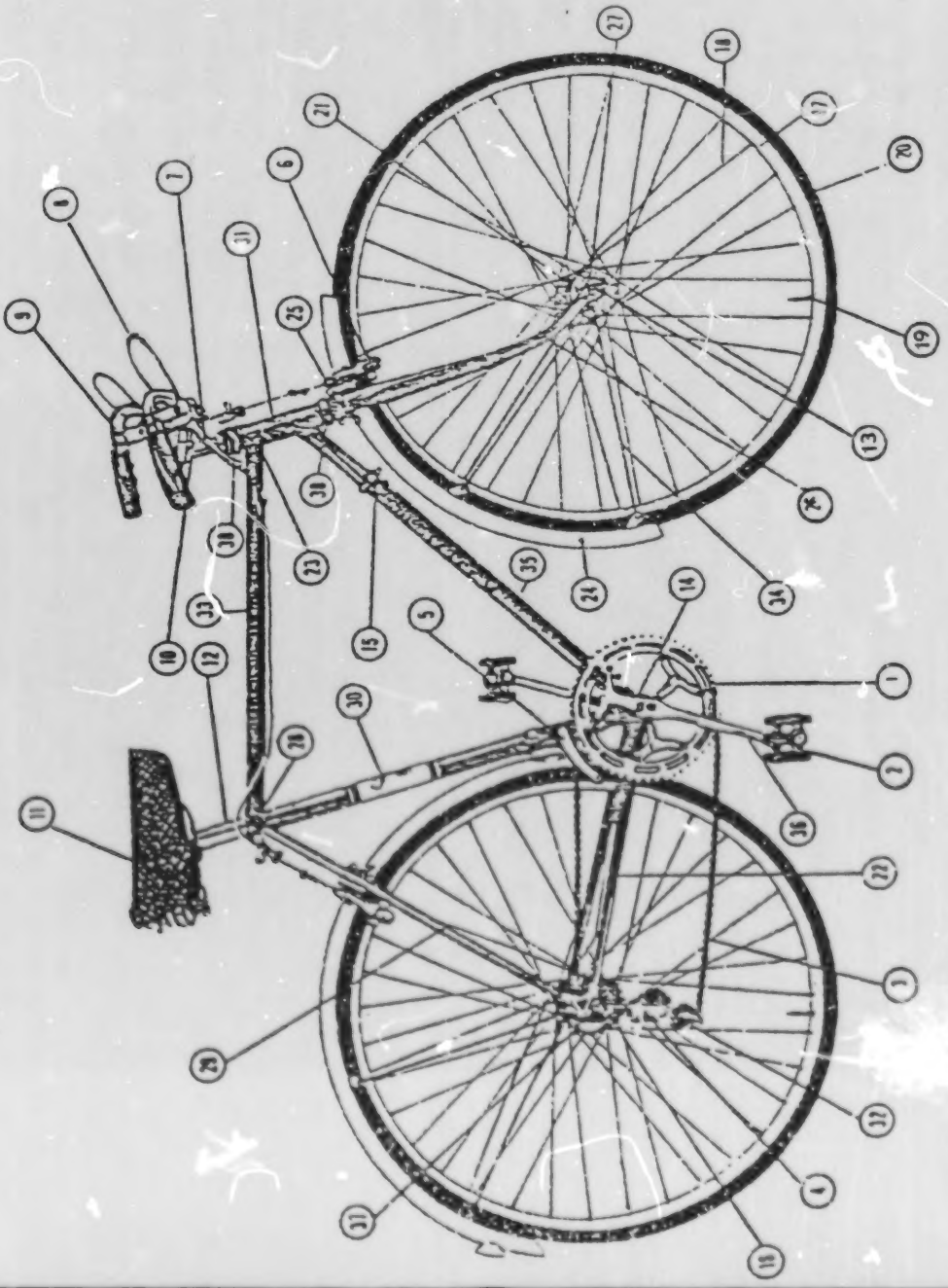
The first test of bike fit is that you be able to straddle the top tube with an inch to spare with both feet flat on the ground. In an emergency, this will allow you to stop safely. For a ladies or mixte frame, imagine there is a top tube to straddle. Also, test to see if the length of the top tube is correct by placing your elbow on the nose of the saddle. Your fingertips should just touch the handlebars. If the top tube is too long, you will have to bend too far forward and may not be able to reach the brakes easily. One other test should be conducted. Sit in the saddle with your feet on the pedals. When a pedal is at its lowest position, your knee should be slightly flexed.

After you have selected a bike of the proper size and style, you should always test ride it before buying it. Make sure that the saddle is level or has a slight upward tilt. If it is tilted downward, excess load is placed on the arms, forcing the rider back onto the saddle. With hands off the handlebars, check to see if it steers straight and if it steers by leaning equally to each side. Next, with hands on handlebars, make sharp turns to see that it feels the same for left or right turns. If the bike passed these tests, it is probably in alignment. If not, the frame could be bent.

After the alignment inspection, check the bearing for smoothness without looseness in the wheels, pedals, headset and bottom bracket. To check the handlebars, squeeze them hard to ensure the levers do not reach the handlebars. The brake blocks should contact the rim squarely, and the clamp hooks should not get within 1/2 inch of the cable housing stop. After the brakes have been inspected, ride the bicycle and shift the rear derailleur from high to low and back again for each chainwheel. It is important that the bike shift into and out of the large chainwheel and large sprocket combination and that, while in the small chainwheel and small sprocket combination, the chain is tight on the lower side.

Before buying a new bike, learn these tests on your old one or on a friend's. If a bike you buy meets these requirements, you have made a good first step in bike selection and fit.

Student Handout: Bicycle Parts



KEY TO BICYCLE PARTS

1. Chainwheel
2. Pedal
3. Chain
4. Rear derailleur
5. Front derailleur
6. Caliper brake
7. Brake lever
8. Brake cable
9. Handlebars
10. Handlebar stem
11. Seat (saddle)
12. Seat post
13. Quick-release skewer (for fast wheel removal)
14. Bottom bracket
15. Gear-shift lever for rear derailleur
16. Freewheel gear cluster
17. Rim
18. Spoke
19. Valve
20. Tire
21. Hub (high-flange type)
22. Chainstay
23. Lug
24. Fender
25. Fork crown
26. Fork
27. Wheel dropout
28. Seat cluster lug
29. Seat stay
30. Seat tube
31. Steering head (headset)
32. Tension roller, rear derailleur
33. Top tube
34. Fender brace
35. Down tube
36. Cotterless crank
37. Rear drop out
38. Headset (top and bottom)

Student Handout: Two Minutes A Cyclist Can't Affort to Miss

Source: Larry Wuellner, "Two Minutes a Cyclist Can't Afford to Miss," in "Cycling Activities" (n.p.: Auto Club of Missouri, n.d.), n.p.

Is bike inspection something you have been reserving as a rainy day activity? It shouldn't be. Make this two-minute check each time you're preparing to ride. Correct any problems and make adjustments on-the-spot. When you ride, your attention should be on the road at all times. If you hear a rattle, or suspect a problem, get off the road to check it. Don't start looking your bike over while you are moving. Taking attention from the road ahead to glance down at the bike causes many bike/bike, bike/auto, and bike/ditch collisions.

The Two-Minute Check:

1. Try hard to twist the saddle up and down, left and right. If it doesn't move, it's secure.

2. Put all your weight on the handlebars, making certain they won't slip in a panic stop.

3. Pick up the front of the bike and spin the front wheel. Check brake alignment on rim, proper brake pad-rim clearance (1/8"), axle or quick release tightness, wheel trueness (tire spokes may be worn to the cord), fender or bike bag should not rub against tire.

4. Pick up rear of the bike to check the same parts as well as vertical alignment of roller cage derailleur, check: chain, for bent or frozen links, cluster for bent teeth or lodged debris. Check axle nuts or quick release levers for tightness. (Many a quick release has been too loosely adjusted to hold the wheel under uphill pressure and locked the tire against the rear stays or caused a slight rubbing which soon becomes a flat or blowout.)

5. Spin each pedal and then push them left and right to check the crank for looseness. There should be no "joggle" or lateral play in the crank axle.

6. Look the bike over to make sure nothing is hanging loose, is cracked or presents a sharp edge should you have it jammed against you in the event of a fall with your bike.

7. Shift through all your gears to make certain the chain won't "throw-off" the cluster and lock itself against the wheel. If it should, adjust the derailleur screws to limit the reach of the derailleur's throw.

8. Brace the front fork between your knees and make sure the handlebar stem is tight by trying to twist the handlebars left and right. Adjusting bolt, stem binder bolt, is at the tip of the handlebar stem and must be very tight.

9. Grip the handlebars with one hand and the front wheel with the other, trying to force the handlebars toward the wheel and then apart. If something feels loose, it will likely be the headset. The adjusting nut is where the stem meets the head tube.

10. Check tension on gear shift lever screws. If they are too loose, the gears will shift themselves. If they're too tight, they will be hard to shift.

Student Handout: Tools and Equipment Needed for Course

Required Tools

Adjustable end wrench (Crescent wrench) 6" size
8-9-10 mm wrenches to supplement the crescent wrenches
Dumbbell-shaped multi-socket bicycle wrench, metric or British to fit your own bike
Freewheel cluster removal tool
Flat steel open end bicycle cone wrenches to fit your hubs
Chain link extractor
Spoke wrench
Crank-arm extractor
Screwdriver, stubby narrow blade to fit derailleur adjusting screws
Screwdriver, stubby wide blade to fit whatever other slotted screws you have on your bike
Special tools include:
Allen keys to fit socket head screws on Campy, Simplex, Suntour derailleurs, recessed stem bolts, and socket head seat clamp bolts.
10 mm wrench for micro-adjusting seat posts. 8 mm socket for Campy handlebar shift levers.

Required Tire Repair Kit

Pump on bicycle
2 tire levers, at least one with hooked end;
2 tire boots--cotton denim fabric cut approximately 1" x 2" (a patch works for this also)
Abrasive cloth, about 1" x 2"
6 tire patches
1 tube or bottle rubber cement and 1/2" adhesive tape, 1 foot rolled up
1 spare innertube
1 miniature bottle of contact cement
Tubular tire users carry instead pump and 2 spares
Pressure guage.

Supplies and Equipment

W-D 40
Paint brush for cleaning, 1", old or cheap
Baking pan to catch drippings--9" x 13" approximately
Jars, foil cups, etc. for parts, solvents, etc.
Rags for cleaning
Oil, SAE 90 automobile rear axle oil, 1 quart
Kerosene
Cleaning solvent from gasoline station, 1 gallon or 1 quart
Bicycle grease
Talcum powder for dusting inner tubes before replacing in casing
Plastic Rubber (Duro) or Rubber Material (Devcon) for filling tire tred cuts
Contact cement (Sears or 3M) for permanent tire casing boot installation.

Student Handout: Cyclist Clothing

The cyclist should wear clothes that suit the weather in which he rides. In warm weather, shorts that are tight fitting and long enough to extend below the saddle edge are recommended. For the very active cyclist, cycling shorts with a chamois crotch lining are available. Chamois is the best material to protect the skin against the pressure and friction of saddle contact, so the shorts are worn without underwear. A cyclist may simply add chamois lining to shorts he already owns.

For cooler weather, the cyclist must dress to stay warm without impairing his mobility and flexibility on the bicycle. One common problem of cyclists is that they become too hot, sweat, and then get wet and cold. Often it is best to dress in multiple layers in colder weather, with the outer layer windproof. Try to keep your clothes adjusted so that if you sweat, it evaporates quickly, particularly around the waist. To keep long pants out of the chain, use pant clips, rubber bands, or clothes pins or wear a warm-up suit with tight-fitting calves. A wool warm-up suit is also an answer to cold weather. Wool absorbs and transfers water, and does not lose its insulation quality when wet. Therefore, it allows evaporative cooling and provides warmth. Although nylon and polyester do not allow evaporation, they are more easily worn and cared for than other materials. Thus, a blend of wool and synthetic fibers might make a good choice for riding apparel.

A cyclist may use mudguards, fender flaps, and mudflaps, to provide some protection from mud and rain; nevertheless, special clothing is still needed. Examples of wet weather clothing are the standard rain cape, a jacket, or a sou'wester style hat which protects the face. However, do not wear a cape with a long visor because it might block your view when your head is bent down. In cold weather, a full rainsuit including galoshes may work well. The Bell or MSR helmets work quite well in rainy weather and never should be discarded when riding in the rain. Actually, no method can keep a cyclist from being wet or sweaty. (A spare change of clothes and a towel for the end of the ride are the best methods for wet weather riding.)

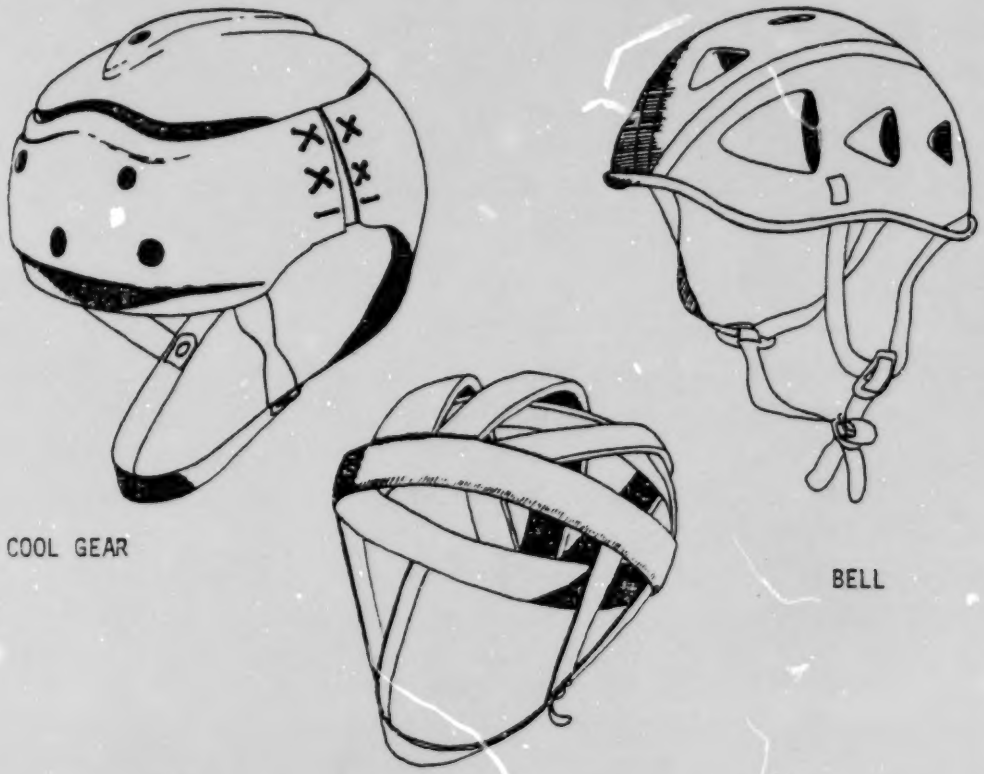
Gloves

Cycling gloves with padded leather palms, cloth mesh backs, and no fingertips are recommended as a safety precaution. The padded leather palms help prevent numb fingers caused by handlebar pressure on the hands. They also protect the cyclist from scraping his palms if he has an accident. The mesh backs are good for wiping the sweat off the cyclist's face. Most cyclist shops carry a variety of cycling gloves.

Shoes

Cyclist shoes must be lightweight, low cut, and have a firm sole. Regular cyclist shoes are available with a hard leather sole and a spring steel shank between inner and outer soles. Some cycling shoes have cleats which clamp onto the pedal for efficient transfer of energy from muscles to drive train. However, any shoe that is comfortable, breathes well, and has a hard sole should prove adequate for most cycling.

Helmets



COOL GEAR

BELL

LEATHER

Most serious bicycle accidents cause head/brain injury. Helmets with a strong outside and with crushable but rigid foam inside are highly recommended because they protect against the most frequent cause of permanent disability and death to cyclists. Ventilation is also very important in considering the purchase of a helmet so that the cyclist will be comfortable wearing it. The illustrations on the preceding page depict different types of helmets: cool gear, leather, and Bell helmets.

B. Class II

1. Ride

This class should begin with a Bike Rodeo, a basic skill test. The bike rodeo can be used to assess the skill of students. The rodeo should be set up in a large empty parking lot and will require a considerable amount of advance preparation. You should mark off the course (see pages 35-41). with chalk or masking tape. Foam blocks or balloons can be used as obstacles. Have the entire course set up before students arrive. Explain the significance of the rodeo and individual tests. Allow students to practice for 15 minutes. Then, begin scoring each student. Cumulative totals should be given to each student. You may wish to repeat these tests at the end of the course to measure each student's improvement.

2. Brakes

Discuss brake types. Emphasize that you will give instructions for maintenance of hand brakes, not coaster brakes. When students encounter problems with coaster brakes, they should consult an expert mechanic. If any student's bike has safety levers, point them out and discuss their use. Also, discuss problems with them, and differences in brake adjustment due to their use.

Demonstrate the basic brake test. Indicate how to check for wear and how to replace any worn parts. Make sure all students know how to adjust their brakes properly. Emphasize the need to check for adjustment continually.

3. Basic Posture and Pedaling Techniques

Demonstrate proper posture again. Emphasize importance of proper bike fit. Discuss advantages and disadvantages of different frame styles and handlebar styles (page 44).

Introduce ankling technique (page 46). Also, introduce toe clips to those who do not use them. Discuss advantages.

4. Laws

Emphasize that, in North Carolina, the bicycle is legally considered a motor vehicle. Point out that this ruling gives cyclists the same rights as motorists, but also implies the same responsibilities.

Certain laws apply specifically to cyclists and should be discussed.

1) Bicycles are prohibited from all interstate and fully controlled access highways.
2) Bicycles must have a front lamp visible from 300 feet and a rear reflector or lamp visible from 200 feet at night.
3) Bicycle racing on state-maintained roads is illegal without prior permission of the Department of Transportation.

Discuss interpretation problems of the law. In particular, discuss riding as far to the right as practicable and "following slow moving vehicle" laws. Point out that many motorists and cyclists do not recognize the right of cyclists to ride on the roadway.

Student Handout: Bike Rodeo

The following pages describe briefly the purpose and layout for seven typical skill tests and a guide for scoring.

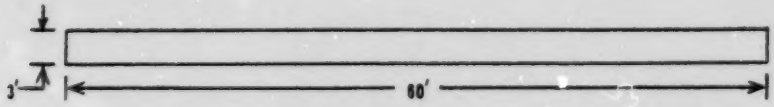
I. Ride and Dismount

Purpose: To show how to start and stop without wavering.

Test: Rider straddles bike, one foot on the ground, the other placed on opposite pedal, pedal placed 45 degrees above the horizontal, hands on handle grips. He should simultaneously push off, press down on the pedal and raise his body up and back onto the saddle. Rider then pedals a few turns and applies brake. When almost stopped, he should pull his body forward off the saddle, one foot on low pedal, opposite foot forward and down to engage the ground as his bicycle stops.

Scoring: Ten points if rider mounts, steers bicycle without losing balance or swerving from side to side erratically, gives his attention to a 180 degree area ahead, and then dismounts correctly. Deduct two points for each incorrect maneuver.

Significance: With proper saddle height, the inexperienced rider tends to start or stop while seated. Since his feet will not reach the ground, he tends to wobble into the traffic stream, or to fall to one side when stopping. If the pedal is not placed in the proper position for starting, insufficient speed may result in lack of control. This method gives full control at start and stop..



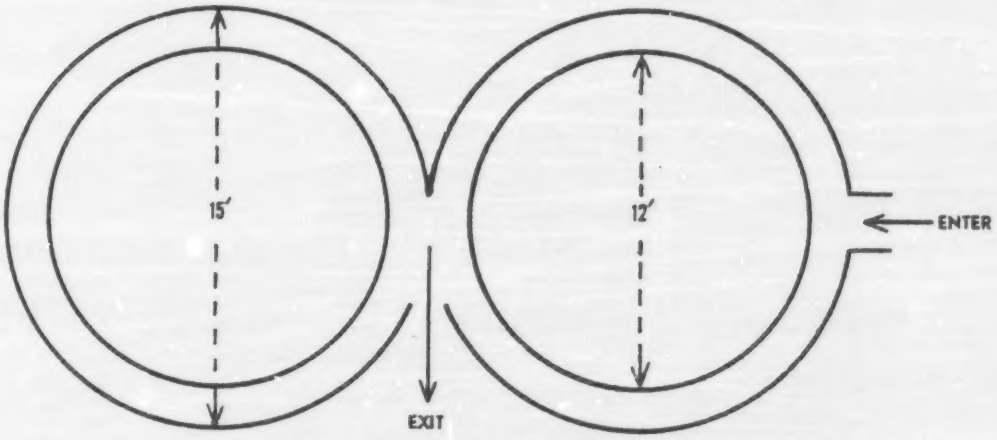
II. Circling and Change in Direction

Purpose: To test balance and related sense of momentum, and the changes in balance required by intended changes in direction.

Test: Start 5' from the circle. Rider must enter circle at the opening and ride half-way around the first circle to his right, then change direction to ride to his left around the second circle. He reenters the first circle to his right, completing a figure 8. He repeats the procedure one more time, and returns to the meeting point of the circles for exit as marked.

Scoring: Ten points is the best possible score. Deduct two points for each time the rider rides off the marked lane.

Significance: In traffic, there are many instances calling for a swerve in direction to avoid a pedestrian, a series of obstacles, a pothole in the road, or an oncoming vehicle. The rider must be able to change his direction in a precise manner, sometimes with little warning, so that the bicycle will go where he intends. The test demonstrates precision of riding and confidence in the ability to control the bicycle, avoiding a spill or a collision.



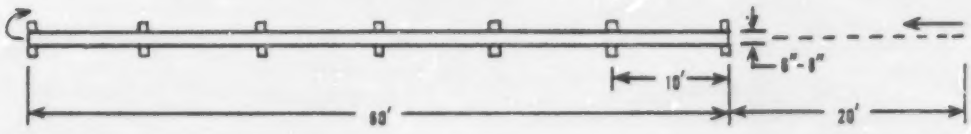
III. Straight Line Control

Purpose: To test poise and control in driving and to establish the ability to ride in a straight unwavering line as required on the road.

Test: Rider should start 20' from the 60' lane and the first pair of obstacles which should be foam rubber cubes or balloons only. The rider may go at any speed but must go between each of the pairs of markers without touching them. Markers may be placed at 5' or 10' intervals on opposite sides of the lane, 6 to 8 inches wide. The rider should turn to the outside of the marked lane and repeat the test. This time he should be directed by the judge to check traffic from the rear and to remove his left hand to make the proper arm signals for a left-hand turn, a right-hand turn, and slow or stop signal.

Scoring: Ten points if the rider steers his bicycle without veering between all markers, without touching them with the tires or stopping the bicycle, and signals correctly. Deduct two points for each faulty move.

Significance: For efficient cycling, the prime requisite is the ability to maintain perfect balance without a wavering path. The ability to ride a straight line permits the cyclist to maintain a position close to the road edge, out of the stream of traffic where necessary. It is necessary to watch for traffic approaching from the rear before making any maneuvers, without steering off the road or into the traffic. Signaling or gear-shifting requires removal of one hand without disturbing equilibrium.



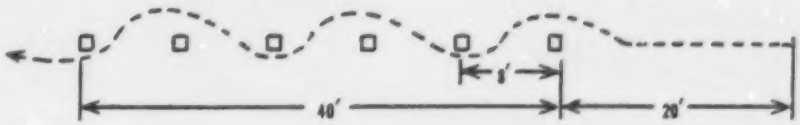
IV. Weaving - Maneuvering to Avoid Obstacles

Purpose: To test the ability to change direction quickly, which requires balance judgment.

Test: Rider should start 20' from the first obstacle, riding at normal speed and proceed by going right of that obstacle, left of the second one, etc. Obstacles (foam blocks or balloons) should be 8' apart.

Scoring: Ten points if the rider does not hit any obstacles and if he goes alternately to the right and left of each one in the line. Deduct one point for each time he makes a wrong turn or touches an obstacle.

Significance: Hitting or missing an object in the road whether it's a stone, a hole, or a pedestrian is a problem of instinct. A rider hits an obstacle because he is watching it, and naturally steers where he is looking. The test teaches the rider to focus on the clear path rather than on obstacles.



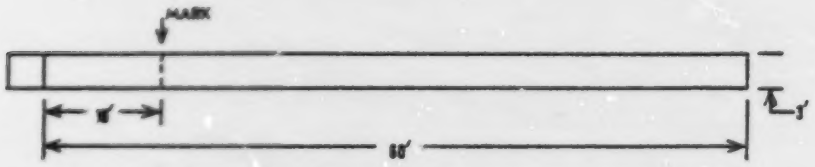
V. Stopping Ability

Purpose: To test visual reactions in relation to momentum and to establish the rider's ability to stop in an emergency.

Test: Rider should go directly toward a cardboard box at a moderate speed and stop with the front part of the wheel 10" to 14" from the box. Brakes should be applied by the rider as he crosses the mark or line painted on the path as indicated. Judge should measure stopping distance.

Scoring: Ten points is the best possible score. Deduct two points if the rider touches the ground with either foot before bringing the bicycle to a stop or if his tires skid. Deduct one point for each 6" in excess of 14" Deduct 10 points if the rider touches or knocks over the box.

Significance: In the same way that the distance required to stop a car increases with speed, the distance required to stop a bicycle also increases. Frequently cyclists must stop in an emergency manner due to an oncoming car, a turning car, or a pedestrian who steps off the curb in their path. Sudden stops cause the weight to shift forward, allowing the bicycle to skid and lose control or to pitch the rider over the handlebars. It is necessary to learn to shift weight to the rear to avoid loss of control in a skid. This test is designed to teach riders to judge distance, according to speed, so they may stop their bikes before colliding with an obstruction.



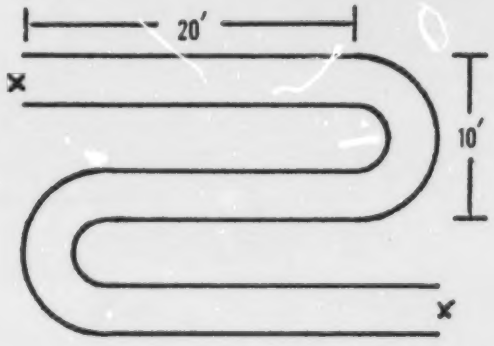
VI. Short Radius Turning

Purpose: To test the ability of the rider to turn his bicycle around easily and smoothly within a limited area.

Test: The rider travels within the marked lane following the S curves.

Scoring: Ten points is the best possible score. Deduct one point each time the driver touches the ground with either foot or rides over the border lines.

Significance: A rider is often called upon to turn around in a narrow street or constricted area. The successful completion of this test involves making smooth and easy turns without using the brake excessively, touching the ground with his feet or the border lines with either wheel of the bicycle.



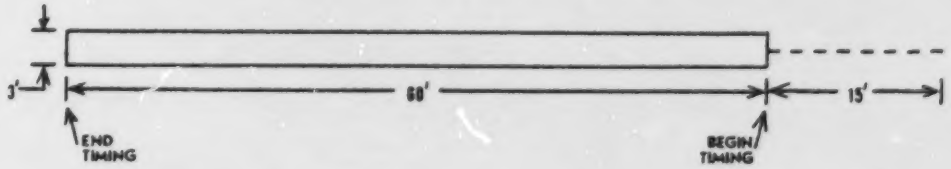
VII. Slow Speed

Purpose: To test balancing at slow speed.

Test: Start with bicycle 15' from a 60' lane and ride slowly toward the lines. Rider should go between the lines of the lane as slowly as possible without touching either line. The judge begins timing the rider as he enters the lane. He should take at least thirty seconds or longer to reach the other end of the lane.

Scoring: Ten points if rider meets minimum time requirement of thirty seconds. Deduct two points each time he touches the line.

Significance: This test trains for straight riding, by developing a sense of balance as well as a sense of momentum of turning. The test emphasizes how a slight swing of the front wheel serves to reinstate the rider's balance when he starts to topple while pedaling at a slow speed.

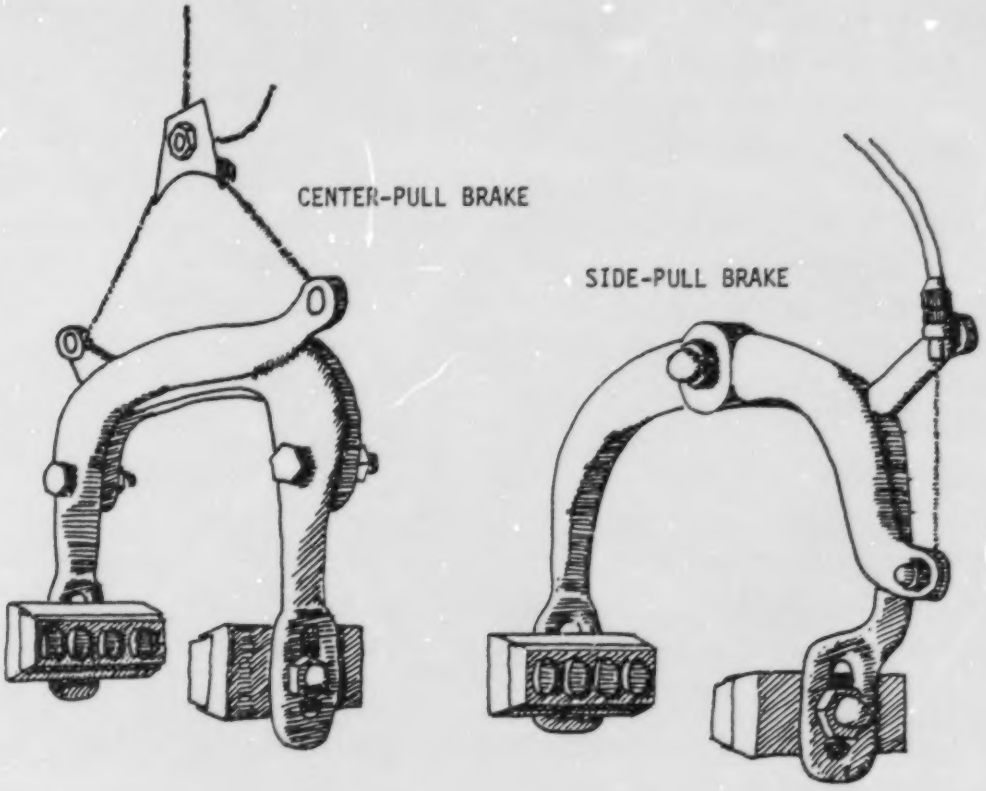


Student Handout: Brakes

1. Hand Brakes

Hand brakes are usually either center-pull, side-pull, or expander handbrakes. The center-pull and side-pull brakes are the most common and work by forcing brake pads onto the wheel rim which allows friction to stop the wheel. Both are operated by squeezing a lever on the handlebars which puts tension on a cable and in turn forces the brake pads to the rims of the wheel. As the rubber brake pads close, the wheel stops turning. The activating cable either pulls from the side or the center, depending on type of brake.

When pressure on the hand lever is released, the spring-loaded arms should return the shoes to a position away from the wheel rim. However, if one brake shoe continues to rub the wheel, brake mechanism has shifted on the long holding bolt. This can be adjusted by loosening the holding bolt, and shifting the brake mechanism until both brake shoes clear the rim before retightening the holding nut.



Make sure the hand lever is in a released position if both shoes drag. If the cable is stuck in the housing and holding the rubber shoes against the wheel, apply grease to the cable. Next, add oil on the two pivot bolts that hold the brake arms manually. If the brake arms are bent or rubbing against each other, carefully move them apart. Also check for broken return springs or bent pivot bolts which could cause the drag of the brake shoes. If the rubbing of one brake shoe continues after the pressure on the hand lever is released, the whole brake mechanism may have shifted on its pivot bolt. If this is the case, loosen the pivot-bolt nut, and carefully move the mechanism until both brake shoes clear the rim before retightening. If this keeps recurring, bend the spring that spreads the inner and outer arms. If both brake pads are dragging, follow the same procedure as if a brake arm were dragging.

Proper brake cable adjustment is quite important. With a properly adjusted brake cable, the brake pads should clear the rim by about 1/16" when the levers are released. When the lever is squeezed, the brake pads should hit the rim before the lever reaches the limit of its travel. If this is not the case, the cable can be adjusted by loosening the cable clamp bolt on the end of the cable, moving the cable through the clamp to the proper position, and retightening the cable clamp. Some bikes are equipped with an adjusting sleeve mechanism at the end of the cable housing. Minor adjustments of cable length can be made by loosening the lock ring on the adjusting sleeve, turning the adjustment sleeve to the proper position, and then tightening the lock ring. When you buy a new bicycle or replace old cables, the cables will need tightening after a week or so because they have a tendency to stretch.

Brake shoes, usually made of rubber, are either the standard type which are held onto the slotted end of the brake arm by a bolt and adjusted so that they meet the rim vertically or horizontally, or the eye bolt type which are held to the tapered end of the brake arm by a clamp and adjusted like the standard type. If correctly adjusted, the brake shoe should hit the rim squarely.

Brake noise with the coaster brake means something is wrong with the brakes. However, with hand brakes, brake noise does not always signify

any malfunction. The rim of the wheel could be dirty or dented, in which case the rim should be cleaned or straightened.

2. Coaster Brake

The coaster brake is used in one-, three-, and some five-speed bicycles. Although they do not brake as well as hand brakes, coaster brakes are long-lasting and, with care, may never need repair. However, they are much more difficult to service than hand brakes.

On the rear hub there is an oil nipple which admits lubrication to the inner mechanism of both coaster brake and three-speed gears. To keep your bicycle in the best running condition, you should put two or three drops in this oil nipple once a month. If the coaster brake develops a problem, it is an indication that new parts will probably be needed. The coaster brake is very difficult to fix and should be taken to someone with experience in its repair.

Safety Levers

Some bicycles come equipped with safety levers on the straight portion of the handlebars. Although pulling on these levers will slow the bicycle down, it will not stop it. Thus, most experts scorn safety brakes because they give riders a false sense of security. If your bike does have safety levers, brake adjustment procedures will differ somewhat.

Student Handout: Posture and Pedaling

The posture or riding position of the cyclist is determined in part by the style of the bike. The handlebars on bikes are of three types: high-rise, tourist (or upright), and racing (or drop).

Each of these handlebar styles dictates a different riding position. First, there are the high-rise children's bicycles with the handlebars raised to shoulder height. These bicycles are not safe or efficient transportation because it is impossible to make sharp turns with the arms at shoulder level.

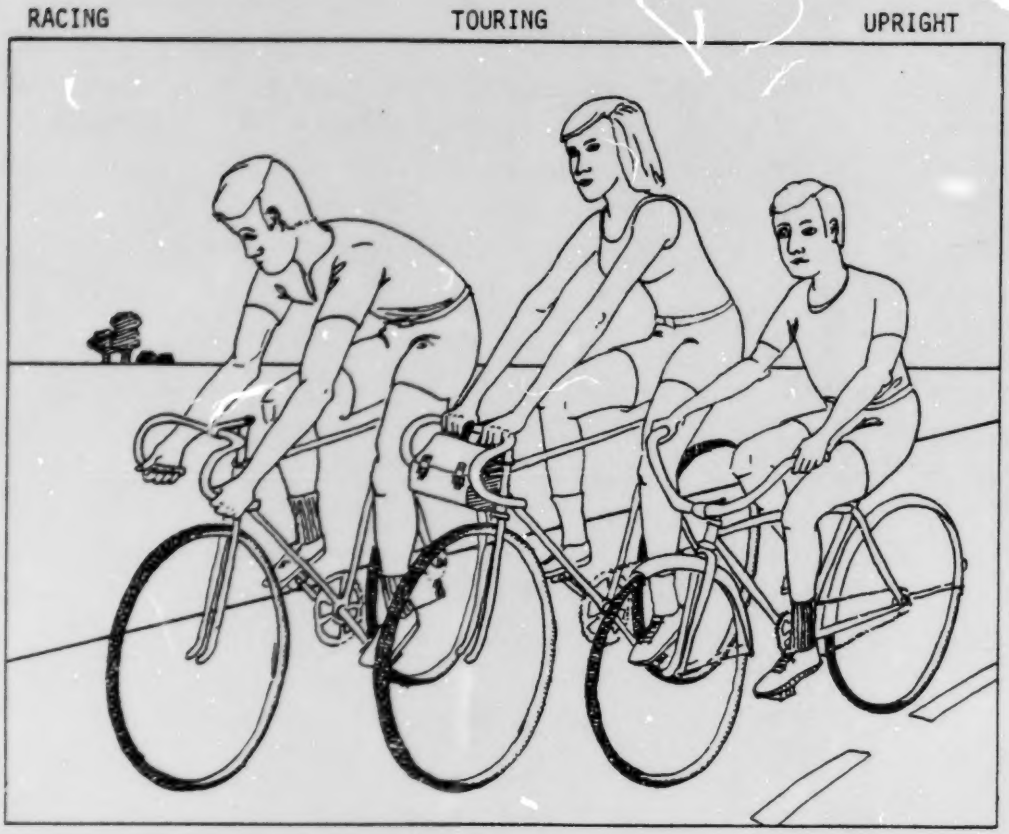
Other bicycles are equipped with tourist or upright handlebars. Advantages of this handlebar style are:

1) There is better visibility of the upright cyclist to motorists.
2) The hands are closer to the brake levers at all times.
3) There is improved breathing when not "crouched."
4) Cyclist's vision is improved when the head is in a more upright and relaxed attitude.
5) Hand signaling is easier.

Lastly, some three-speeds, five-speeds, and most ten-speed bikes have turned down handlebars that require the bicyclist to assume forward leaning positions. This position is favored by many more experienced riders. Listed below are several advantages of the dropped handlebars.

1) The body weight is partially supported on the arms.
2) This position relieves the pressure on the spinal discs.
3) This released pressure reduces degeneration of several parts of the spine, thus, reducing back problems.
4) The arms act as shock absorbers to relieve many discomforts previously absorbed on the saddle.
5) The crouched position will allow the back muscles to support the weight of the rider and help to transfer that weight to the pedals.
6) The steeper the hill, the more the arms and legs help the cyclist to climb the hill.
7) The crouched position may reduce wind resistence by up to 40 percent of that for an upright saddle. Thus, with the same effort, the cyclist can maintain higher speeds. This fact allows the cyclist to make longer trips with no additional energy expended.

8) The lower body position lowers the cyclist's center of gravity. This helps prevent somersaulting over the handlebars in an emergency stop and allows more precision and greater maneuverability.

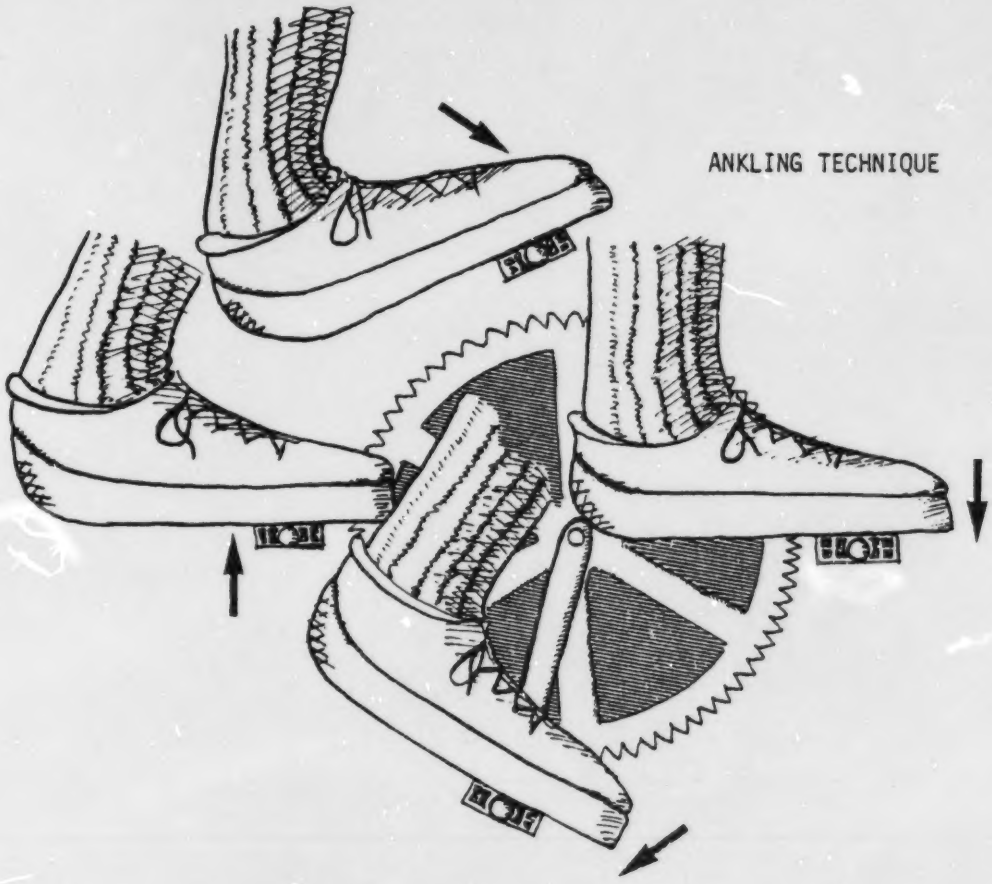


The handlebars should be as wide as your shoulders. For the dropped handlebars, the bottom position with hands near the ends should allow comfort when going fast or against the wind, while the top position with hands near the stem allows a relaxed position for sightseeing. The forward adjustment of the handlebars can be achieved by either moving seat or buying a different length stem.

Seat selection represents a major factor that affects posture. Mattress saddles are suitable for bicycles with upright handlebars, but the crouched position with dropped bars requires the narrower "racing"

saddle. Saddle selection is important because bad fitting or worn out saddles hurt so much that riding is a pain and not a pleasure. Leather saddles are often preferable to plastic because leather will assume the rider's shape, and will eventually be more comfortable than most padded saddles. Saddles with springs or excessive padding cause the rider to lose energy on each pedal stroke by compressing the padding, The saddle should be raised high enough that when the heel of the foot is placed on the pedal at its lowest position, the knee is almost straight. In summary, a proper fitting, comfortable saddle is essential for proper cycling posture.

The position of the feet on the pedals is important to the rider's posture. The foot should be placed so that the ball of the foot is just over the pedal spindle. Many cyclists use toe clips which hold feet in place on the pedals. Toe clips come in three lengths. If toe clips are adopted, the correct length would just clear the shoe toe.



ANKLING TECHNIQUE

A slight bend of the knee is desirable when either pedal is at the bottom of its stroke. If the leg is perfectly straight, a side-to-side wiggle on the saddle is necessary to maintain pressure on the pedals.

Many experienced cyclists use a method known as "ankling" to increase the efficiency of their pedaling. By flexing your ankles, you can apply pressure forward on one pedal before it reaches the top of its arc while at the same time pressing backwards on the other pedal as it reaches the bottom of its arc. This allows the cyclist to exert pressure during more of the rotation of the cranks. Ankling is very useful in climbing hills. When pedaling at a high crank rpm, ankling is less useful and perhaps contraproductive.

Another way to increase pedaling power is to use toe clips. Toe clips allow the cyclist to pull up on the pedals as well as press down, giving added power to the wheels. Toe clips are highly recommended for safety because they keep feet away from the wheels, they keep feet from flying off the pedals with subsequent loss of control at high rpms, and they make it easier to backpedal when the bike is stopped.

Student Handout: Laws

The bicycle has been legally considered a vehicle in North Carolina since 1937. Thus, it has full rights and responsibilities on the roadway and is subject to all regulations governing motor vehicles. However, the bicycle is specifically prohibited from all interstate highways and fully controlled access highways. In addition, North Carolina law requires that a bicycle have a front lamp which is visible from a distance of 300 feet and a rear reflector or lamp which is visible from a distance of 200 feet at night. A recent law also prohibits bicycle racing on state-maintained roads unless prior approval is granted by the Department of Transportation.

The preceding paragraph includes all North Carolina laws which mention bicycles; however, many problems of interpretation exist. The major interpretation problem has to do with the motor vehicle code which says that a bicycle should be ridden as far to the right of the roadway as practicable. Since practicable means safe, reasonable, and possible, a bicyclist may legally ride well out into the traffic lane if his speed or the condition of the right hand edge of the road makes it appropriate. Because the shoulder is not part of the roadway, the bicyclist is never legally forced to ride there. Also, as a motor vehicle, a bicycle must legally make left turns from left turn lanes as would cars.

Cyclists face additional problems because many people do not recognize that bicycles are legally entitled to use the roadway. Not only do cyclists have a legal right, they also pay a tax on bicycle tires and tubes which is similar to the state gasoline tax. In other words, cyclists contribute to the cost of road construction and maintenance as do motorists. Therefore, they have the same right to roads as motorists.

C. Class III

1. Ride - Uncrowded Streets

As in the first class, try to keep students fairly close together. Instruct students about the dangers of streets with parked cars. Watch closely so that students do not dodge in and out between parked cars.

Demonstrate proper turning techniques and hand signals.

Emphasize legal requirements such as stopping at stop signs. Point out potential hazards such as cars entering the roadway from driveways. Teach students to be aware of these hazards and to ride defensively.

Instruct class on overtaking other cyclists. Instruct them to make sure the other cyclist is aware he is being passed by saying, "On the left" or "On the right." Follow this practice yourself when overtaking students.

Encourage students to pedal at an even cadence. Stop frequently to rest and regroup. These resting times can also be used for instruction.

2. Wheels

Go over the parts of a wheel. Indicate each of these parts by diagram or demonstration.

Demonstrate the procedure for removing a wheel. Since procedure varies according to bike style, demonstrate for all styles of bicycles used by students in the class.

Discuss signs of problems with wheels. Demonstrate proper procedure for tightening axle nuts and tightening loose cones.

Emphasize that wheel trueing is an art which requires practice. Perhaps this is an adjustment best left for a bike mechanic. However, you should demonstrate the proper techniques for those who wish to learn the skill. Show how to flatten rim side bulges and remove vertical bends in rims. Show how to remove vertical wobbles by adjusting spokes that wobble and how to remove lateral wobbles by loosening and tightening opposite spokes.

3. Bicycle Accidents

If students are going to learn to ride defensively, they must have an understanding of common accident types they should avoid. Discuss Ken Cross'accident data and the latest data from the North Carolina Bike Program. Point out common accident types and how to avoid them.

Discuss what to do if involved in an accident. Emphasize need to report all accidents which occur. Point out that possibly two-thirds of all cycling accidents go unreported. In the case of a hit-and-run accident, make every effort to get the license number.

Advise all cyclists to become familiar with basic first aid procedures.

4. Safety Hints

Hand out "Safety Tips for Bicycles" (pages 58-59). Go over each tip carefully. Point out that many of these tips are identical for cyclists and motorists.

5. Intersections

Since the majority of all cycling accidents occur at intersections, you should carefully review and discuss all intersection situations. Emphasize the following situations: stop signs and yield signs; traffic signals; left and right turns; merges; and lane changes.

Student Handout: Wheels

The wheel consists of an axle, a hub with bearings, spokes, spoke nipples, a rim, a rim strip, a tire, and a tube. This section will principally cover rims and hubs and their repair. If the wheel is loose (the rear wheel rubs the frame, or it does not spin smoothly from side to side while you slowly revolve the wheel or while you ride), the problem lies in the spokes and rim.

Removing the Wheel

To remove the wheel, you must first get the wheel off the ground. The more firmly the bike is held, the easier it will be to remove the wheel. For removing the rear wheel of a ten-speed bike, get the chain on the smallest rear sprocket of the gear cluster and on the large front sprocket. If necessary, adjust the brakes so that the tire will slip through them. Then release the quick release lever or loosen the nuts on the axle. Push the wheel forward and pull down to get the chain off the sprocket. For removing the front wheel of a ten-speed, simply loosen the axle nuts. For a three-speed, find the indicator (the little chain and pole that come out of the right side of the rear hub). Loosen the little knurled locknut on the indicator pole, and completely unscrew the sleeve that is attached to the cable which goes to the hand lever. Then loosen the nuts on the axle and remove the wheel.

For a one-speed, the coaster brake must be taken off. Unscrew the bolt and nut which hold the bracket (a metal arm at the left end of the rear axle) to a clamp around the frame tube. Loosen the axle nuts and remove the wheel.

Hubs

The hub of a bicycle wheel can be made of many materials. Aluminum is one favorite material, however steel works just as well. The hub consists of an axle, two bearing sets, and the casing. You should not ride if the wheel appears loose on the axle and can be moved from side to side. If care is not taken in correcting any play, the bearings could be flattened or broken. If the wobble is caused by wheels that are loose on

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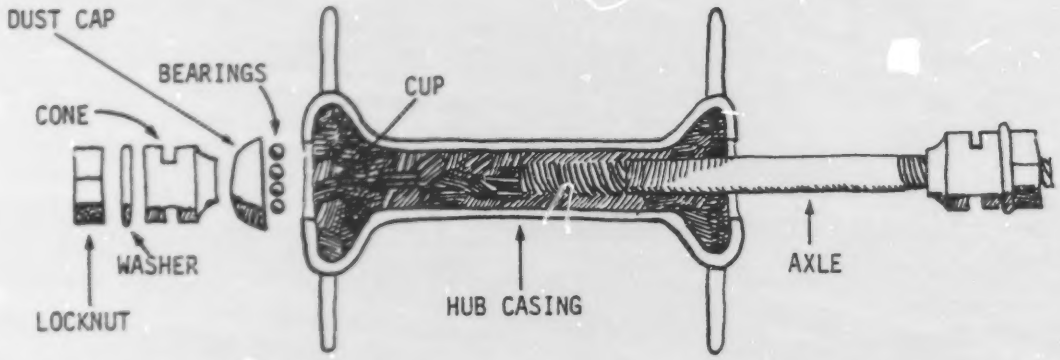
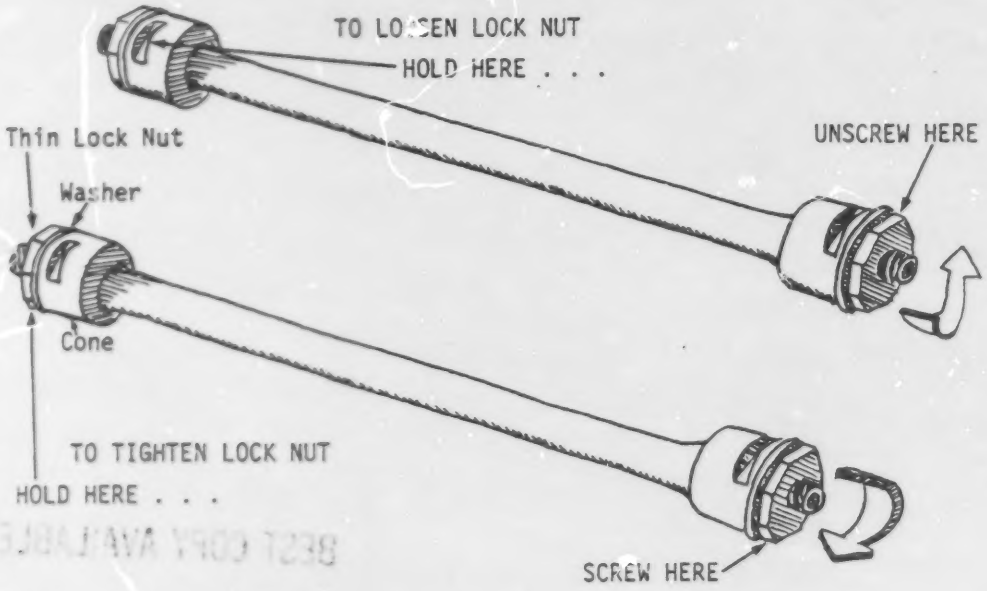


the frame, tighten the axle nuts. If the wheel still wiggles, the problem may be loose cones. To repair this problem, look at the left side of the hub. Beginning on the left end of the axle, there is a big nut (possibly wing nut or a quick release skewer lever), drop-outs (the slot in the frame that holds the wheel), a thin locknut, a washer, a cylindrical cone that disappears into the hub with two slots at the outside edge for a thin spanner, then the bearings and the inside race. To tighten the cones, put a thin spanner in the slots on the left cones. Then get a thin spanner in the slots on the lock nut, tighten the cone up on the bearings, back it off about 1/2 turn, until the wheel spins easily. Then tighten the left



locknut (or big axle nut) against the washer and cone. This may tighten up the cone on the bearings. If it does, use two spanners, one backing the left cone and one tightening the left thin locknut. When you have the cone and thin locknut set so that the wheel spins smoothly but doesn't wiggle from side to side, the bearings are adjusted properly. Sometimes, it will take several tries to get this adjusted right.

Rims and Spokes

Rims represent one of the most fragile parts of the bicycle. Steel rims are the cheapest and heaviest available, however, an aluminum alloy rim provides the best combination of light weight and strength. Aluminum rims also have better stopping characteristics when wet than do steel rims. Since the rim is the braking surface, bicycle rims must be kept clean and rust-free if the bicycle has hand brakes. The condition of the rim can be a big factor in how fast the bicycle is able to stop. Also a dirty rim can quickly wear out brake pads.

There are several ways to locate a wheel (rim) wobble. First, if you have hand brakes, adjust them to where they barely brush the rim at the point of the wobble as the wheel turns. An alternative to adjusting the brakes is to place a piece of chalk against the brake so that it will rub the tire at the point of the greatest wobble when you spin the wheel. Repeat this procedure after adjusting spokes until there is no more wobble. If you do not have hand brakes or chalk, loosen the big axle nut and twist the wheel until it just brushes the frame at the point of greatest wobble. Once the wobble has been located, check the spokes in that area. The spokes are attached to the flanges on each side of the hub and into nipples that fit through holes in the rim. Spokes are made of steel or steel alloys. A spoke wrench should be used to tighten the spokes.

First, tighten the spokes on the opposite side of where the rub is while loosening the spokes on the side of the wobble. (Tighten spokes by turning nipples clockwise, loosen by turning nipples counterclockwise.) This pulls the wheel back in line without changing the roundness of the wheel. You should work with eight to ten spokes in the area that wobbles. Tighten or loosen all spokes just 1/4 of a turn, check the wobble and repeat. Don't try to do it all at once. By tightening the spokes to a

greater tension on one side, the rim can be pulled to that side. Also, if this is not done properly, the spokes and rim may become damaged. Wheel trueing is an art; unless you have a lot of experience, you should go to a bicycle mechanic. For vertical wobbles, loosen or tighten the spokes in the vicinity of the wheel on both sides of the hub. Vertical wobbles usually require a trained mechanic to pull the rim back into round.

After repairing or replacing any spokes, you should check to make sure no spokes that might puncture your tire are poking through the protective rubber strip. If your finger located any of these, remove the rubber strip and file the spoke ends doen.

Student Handout: Bicycle Accidents

Available data indicate that the accident rate for adult cyclists is approximately 113 accidents per million bike miles. Data indicate that experienced cyclists have a lower accident rate than inexperienced cyclists. The higher the annual mileage and the more years of experience, the lower the accident rate. In addition, cyclist age affects the types of accidents that are most likely to occur. Also, all available surveys show that female cyclists have a higher accident rate than male cyclists. The following represents a summary of the major types of accidents between cars and bikes. From this list, it should become clear to the cyclist that he must not only observe all the traffic rules for cars and bicycles, but he must also follow certain safety tips for cyclists in being defensive in his actions with motorists.

CAUSES OF CAR/BIKE ACCIDENTS

Cyclist riding on wrong side of the street	14%
Motorist improper left turn	13%
Motorist improper right turn	11%
Cyclist improper left turn	11%
Cyclist exits driveway without yielding	9%
Cyclist runs stop sign or signal	8%
Motorist runs stop sign or signal	8%
Motorist opens car door	7%
Motorist exits driveway without yielding	6%
Motorist hits cyclist from the rear	4%
Overtaking motorist hits straight ahead cyclist on straight road	0.5%

Source: Identifying Critical Behavior Leading to Collisions Between Bicycles and Motor Vehicles, Ken Cross/ Anacapa Sciences. Search funded by and report published by California Office of Traffic Safety. n.d.

Wrong-way riding is implicated in a large number of accidents in which injuries occur. The following effects of wrong-way riding should be noted:

1. There is increased frequency of intersection accidents.

Riding on the left puts the cyclist in a position where the motorist is not expecting traffic. The cyclist is riding into a blind spot. Wrong-way accidents account for about 20 percent of the Ken Cross injury accident sample. About 80 percent of the wrong-way riding collisions occur at intersections.

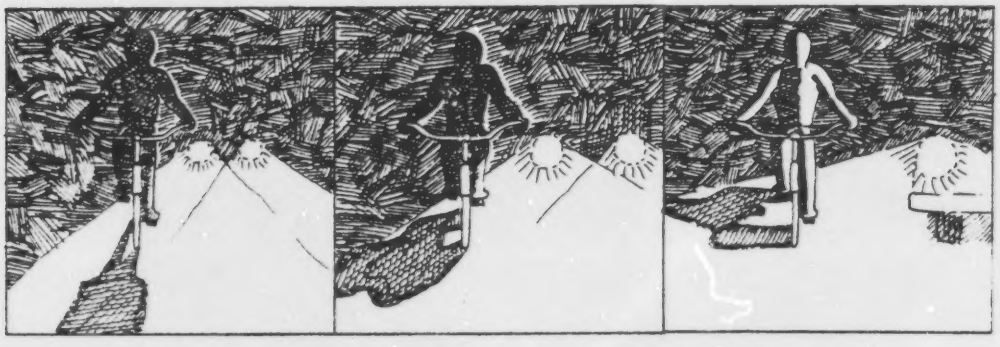
2. There is increased severity of auto/bike head-on collisions.

The severity of a collision is a function of the kinetic energy involved. Since kinetic energy is a function of the square of velocity, the difference between a head-on accident and an overtaking accident for an auto going 15 MPH and a bike going 10 MPH is like the difference between falling from a 77-story building or a two-story building.

3. There is an increase in bicycle/bicycle head-on collisions.

A problem which is not documented by auto-oriented accident statistics is the bicycle-bicycle head-on collision, or other non-motor involved accidents caused by swerving to avoid bike/bike conflict. Every cyclist knows the frustration, however, of having the usually narrow cyclist's road space blocked by a cyclist moving in the wrong direction. The problem is compounded by the uncertainty of which side to pass on since the wrong-way rider has already chosen to ride on the left and may again opt for the left to pass an oncoming cyclist.

In summary, wrong-way riding is clearly not as safe as following the rules of the road in urban areas or areas with frequent driveways or intersections. However, wrong-way riding is rarely implicated in the high-speed rural nighttime accident which accounts for nearly 40 percent of all fatal



NIGHT RIDING THE RIGHT WAY

accidents in the Ken Cross data sample. Large numbers of people who feel safer riding facing oncoming traffic will probably continue to argue that wrong-way riding is sensible. One suggestion for those who desire to ride the wrong way in order to see approaching traffic is to GET A MIRROR AND MOVE TO THE RIGHT SIDE OF THE ROAD. A special trick for night riding the RIGHT WAY: Watch your shadow in the headlight beam of an oncoming car; if your shadow does not move to the right as the car approaches, jump off, or ride off the road to the right FAST.[1]

[1]Vince Daragó, ed., Bicycle Safety Atlas (Washington, D.C.: Urban Scientific and Educational Research, Inc., 1978), n.p.

Student Handout: Safety Tips for Bicycles

1. The bicycle is legally a vehicle and must observe all traffic regulations--red and green lights, one-way streets, stop signs.
2. Keep to the right side of the road and ride in a straight line. Always ride in single file with traffic.
3. If you must ride at night, have a white light on the front and at least a state-approved reflector on the rear. The headlights of a bicycle should be seen from at least 300 feet. Still, at night it is best to assume you are invisible.
4. Give pedestrians the right of way.
5. Look out for cars pulling out into the traffic. Keep a sharp lookout for sudden opening of auto doors.
6. Never carry other riders; carry no packages that obstruct vision or prevent proper control of bicycle.
7. Be sure your brakes are operating efficiently and keep your bicycle in perfect running condition.
8. Slow down at all street intersections and look to the right and left before crossing.
9. Always use proper hand signals for turning and stopping.
10. Don't weave in or out of traffic or swerve from side to side.
11. When passing a slow moving car going in the same direction, you should pass to the left.
12. Cyclists should ride at least three feet away from parked cars.
13. Wear bright colored clothing. The best colors are day glow orange, such as used by road workmen, or white.
14. Listen constantly for traffic approaching out of your line of vision.
15. In rainy weather, allow much more distance for stopping, and don't take corners too fast. Beware of paint marking on the roadway, man holes, and railroad tracks.
16. If railroad tracks are rough, walk your bicycle to prevent a blowout or other damage to bicycle. If you choose to ride over the tracks, cross them at a 90-degree angle to avoid catching tires and being thrown.
17. Watch out for child cyclists. Children on bicycles usually weave from side to side, turn unpredictably without signaling, and cannot be counted on not to run into you even when you are passing them.
18. Storm sewers with grated street covers are a real hazard because tires could drop down throwing the rider and damaging the bike.
19. All dogs are potential enemies. When one bothers you, there are several methods to protect yourself.
    a. If you stop, he will generally let you alone, but watch him carefully before you get under way again.
    b. When you steer right toward him, he will probably back off.

c. You can buy a small can of "dog repellant" for about $2 which will shoot a thin stream of chemical (pepper derivative) about 10 feet. Although the effects are potent, there is no permanent damage done to the animal.

d. If he is far enough away, you can probably outrun him.

20. Loose gravel or sand require a firm grip on handlebars, perfect balance and no turning of the bar until speed is greatly reduced.

21. During slippery weather, ride on the "drops" so the center of gravity is lowered. Pedal action should be extremely smooth.

22. Establish eye contact with the motorists around you to be sure they have seen you.

23. Be courteous to other drivers.

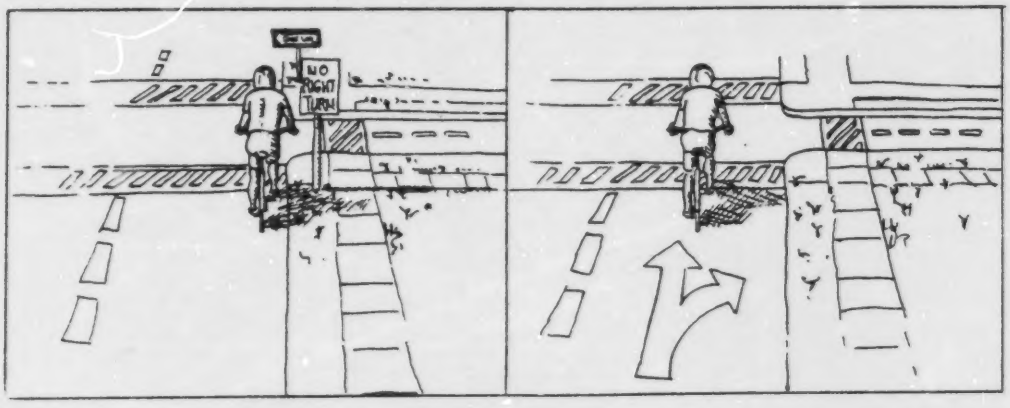
24. Be alert, ride defensively, and ride ready for emergency maneuvers.

Student Handout: Intersections

Intersections can present many hazards for the cyclist. In fact, the majority of all cycling accidents occur at intersections. If the view is blocked at an intersection, beware of cars nosing out into traffic. Although you may have the legal right of way, there is no point in trying to contest right of way with a motorist. Yield the right of way, not your life. Always establish eye contact with motorists around you to be sure they have seen you and that you can communicate your movements. When preparing to turn left, if the road widens, change lanes gradually and signal well in advance. Give the following motorists plenty of warning of your actions. Since bicycles are classified as vehicles, cyclists are required to use the following procedures for turns and lane changes:

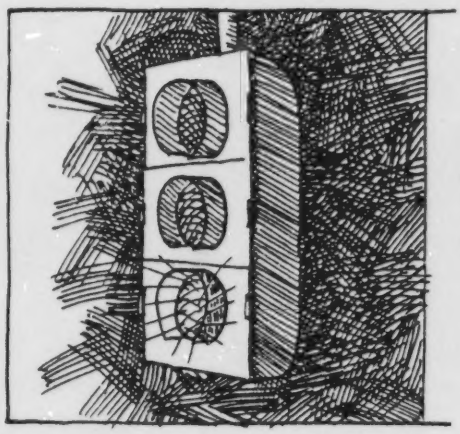
1. Riding Straight through Intersections.

Normally ride at the right side of the outside through lane. If this lane also carries right turn traffic, move to the center of the lane. Control your speed so you do not approach a right turn place while you are in a blind spot at the right rear of a car. Never overtake moving motorists on the right. Always expect a motorist to pull over to the curb anytime to unload passengers, read a map, or do any number of things.



2. Stop Signs and Yield Signs

The stop sign law requires a stop and then a yield. Stop behind crosswalks to protect pedestrians. Ease forward, looking for cross traffic that you must yield to. You do not have to stop to yield; in fact, it will be easier for you to get moving again if you are riding slowly between the crosswalk and the edge of the traffic lane. Find an appropriate gap in the traffic and go. Do not start to cross until there is a clear path to the median or to the other side of the street.



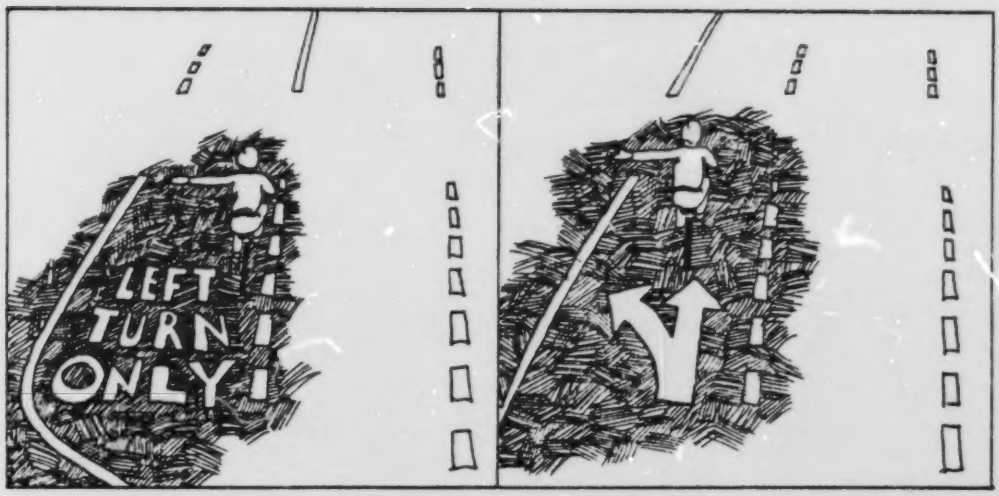
3. Traffic Signals

Obey all traffic signals. Some signals have switches which cannot be activated by bicycles and will not change unless a car comes along. If a light will not change for you and no car is coming along to activate it, treat it like a stop sign, or look for a pedestrian walk button.

4. Turns

Traffic engineers have discovered that if drivers are in appropriate lanes before they enter intersections, turns can be executed easily. The cyclist should also get into the proper lane well in advance.

Right turns can be made from the normal riding position in the right-hand lane. If there is a separate right-turn lane, be sure to move into that lane well in advance.



For left turns, remember this rule: Make lane changes into the left lane well in advance of the turn. If it is a left turn only lane, ride to the right side. If it is a left turn and through lane, stay to the center of the lane. Then turn as other vehicles would. NEVER turn left from the right hand lane!

5. Merges

Handle merge situations like a motorist. Stay to the side of the lane so fast motorists can overtake you. Ride offensively. You have the right to the lane--take it. The motorist will respect your position.

6. Lane Changes

For slow and medium speed lane changes, "negotiate" with the driver of the vehicle you would like to merge in front of by making eye contact and signaling. Move over slowly until you are sure he is willing to make room for you. When traffic is going much faster than you are, you can merge only by waiting for a large enough gap in traffic. Keep up your speed at all times. A constant speed is easier for you and it helps the motorist to judge you.

D. Class IV

1. Ride - Moderate Traffic

As students' skills increase, gradually move them into more difficult traffic situations on each class ride. By Class IV, students should be capable of performing basic maneuvers safely on streets with a moderate amount of traffic. Review skills already taught by allowing different students to lead while you drop back and observe. Each student should be given a turn to lead in order to instill confidence.

You may wish to announce the route for the next mile or two and allow students to ride at their own pace until they reach the next check point. They should wait there for further instructions.

2. Tires

Explain that there are two main types of tires, wired-ons and tubulars. Point out that most students will probably have wired-ons; if possible, bring an example of a tubular tire to class. Discuss advantages and disadvantages of each tire type.

Discuss importance of proper tire inflation. Also, demonstrate how to check tire for proper inflation. Demonstrate how to locate a loose or leaking tire valve. Using a tire with a leak, demonstrate how to locate leaks and how to patch them.

3. Dangerous Road Conditions

Discuss potential dangerous spots for the cyclist like tar spots, metal grates, painted surfaces, and railroad tracks. Instruct the students how to ride through these areas.

Riding in the Rain

Riding in rain poses several potential hazards to the cyclist. However, all cyclists should be prepared to ride in rain because storms often occur unexpectedly. Because rain causes reduced visibility, cyclists should take extra precautions to make sure they are seen.

Rim brakes do not work as well as normal when they are wet. Therefore, longer stopping distances are required in the rain. Instruct students to allow longer distances to stop in the rain and to drag brakes to keep the water off the rims.

Point out that wet roads are also slippery roads. Spots such as tar spots, greasy spots, metal covers, painted surfaces, and plastic traffic dots can be particularly slippery.

Review clothing for riding in rain.

Riding at Night

Review rules for riding at night including required equipment and light colored clothing. Show students examples of lights and reflectors available on the market.

Student Handout: Tires

There are two main types of tires: wired-ons which have a rim bead and a tube like automobile tires and tubulars that are sewn up around the tube and must be stuck to the rim with two-sided tape or special cement. Wired-ons are heavier and stronger, are more resistent to flats and damage, are easier to repair and are the least expensive. They are excellent for everyday, recreational and utility riding. On the other hand, tubulars are light and responsive to acceleration, able to take high pressures and reduce rolling resistence, and are easier to replace than wired-ons. These tires are preferred by racers and fast recreational riders. Tubulars and clinchers, wired-ons, do not fit on the same rim.

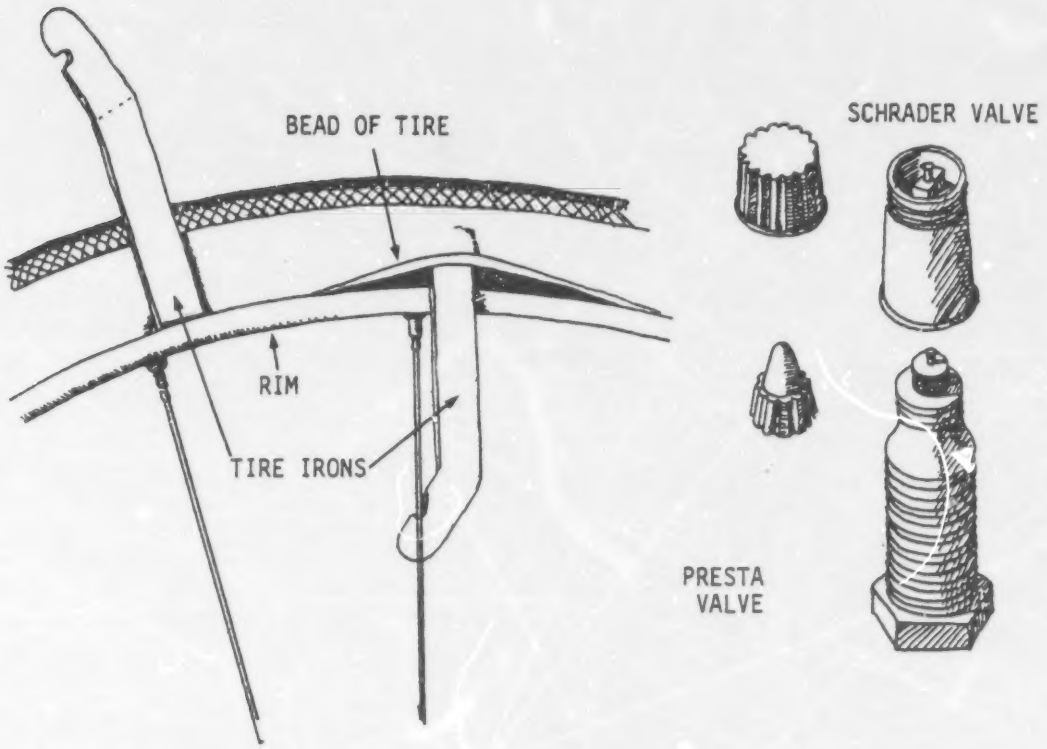
Recently, a new type of clincher has been developed. It has a narrower cross-section, is lighter, and takes higher pressures than a standard clincher. It has the riding qualities of a tubular and the extra advantage of not requiring a new, expensive rim for a tubular tire. However, it is more expensive and less durable than a standard clincher. Because of its special qualities, it is good for recreational riding.

An important thing to remember about bicycle tires is to keep the proper level of inflation checked and maintained. For tires with 80 and 90 pounds per square inch, you should use a tire gauge. Generally, tires lose their first 10 to 20 pounds of air pressure quickly within a week. Proper tire pressure is essential if your bike is to roll as effortlessly as possible. Also, if the tire pressure is too low, the tire will wear faster, suffer more punctures, and allow the rims to be damaged easily. When properly inflated, the tire should feel firm between thumb and forefinger, and the tire shape should change little when the bicycle is mounted or dismounted.

Tire and Tube Damage

Tires and tubes can suffer damage in a variety of ways. General cuts and wear can come from day to day use; broken beads can be caused by incorrect use of tools. Chafing can be brought about by poor alignment or crooked wheels. Rim cuts can be caused by heavy loads and sharp rusty rims. Rim bruises can occur when the tire is crushed between the rim and an object.

If the tire on your bicycle gradually goes flat, the first place to check for a leak is the tire valve. Spit on the end of your finger, wipe it across the valve, and see if an air bubble appears. If one does appear, the valve core should be tightened or replaced.



If the tire valve is working correctly, the problem must be caused by a leak in the tire. The wheel must be removed in order to remove the tire from the wheel. To remove the tire, with the wheel held perpendicular to the floor, grab the tire firmly on both sides and push down toward the floor. This should force one bead away from the rim and down over the rim. Work your way around the wheel until one bead is entirely outside the rim. If a tool must be used, use only a rounded tool and be careful not to pinch the tube against the rim. Special bike tire irons can be useful.

Once the tire is off, inflate the tube to locate the leak. If the tube goes down as fast as you inflate, the tube should probably be replaced. If the leak is small, mark it with a ball point pen before deflating. You may need to submerge the entire tube in water to locate the leak by its bubbling. With the tire kit mentioned in Lesson 1, you are ready to fix the leak.

The area to be patched should be clean and roughed up with the cap of the kit can, emery cloth, or sandpaper. Place glue on the area to be patched. Make sure there is a big enough area of glue for the patch. Let the glue dry until it is tacky before applying the patch. Avoid contact with the sticky side of the patch. Once the patch is in place, it should be dusted with talcum powder so that the patch will not stick to the tire.

Check the tire for the cause of the flat by running a finger all the way around the inside. If there is a large hole in the tire, replace the tire. Small holes can be repaired with a "boot" of denim which can be glued to the inside of the tire. Then reinsert the tube in the tire casing. Next, carefully check the rim to see if it is bent, dirty, or rusty. Make sure that no spokes protrude. The rim strip should be covering the end of all spoke heads.

After you have put the tire back on the rim, check to see that the tube is not pinched under the tire's edge. Also, be sure the valve is properly inserted in the hole in the rim. Inflate the tube to about ten pounds. If the tire is correctly on the rim, deflate the tire and then inflate the tire to the proper pressure before putting the wheel back on the bike.

Student Handout: Dangerous Road Conditions

1. Riding in the Rain

Riding in the rain causes problems with visibility, stopping distances, and slippery roads. In rainy conditions, you will be harder to see and it will also be harder for you to see. Because of reduced visibility, you should take extra precautions to make sure you are seen. To ensure that you are seen, avoid riding on sidewalks or close to bushes or parked cars, and ride straight in your lane of traffic. You should be particularly attentive to motorists entering from side streets. Your visibility may be harmed by rain on his glasses or in his eyes. Therefore, extra precautions, such as longer safety following distances, are recommended.

Rim brakes do not work as well when wet. Therefore, until friction dries the water off the rim, the brakeblock will slip. Rims made of alloy return to normal braking effectiveness in about 40 feet, while rims made of chrome plated steel might allow several hundred feet of poor braking. To counter the reduced braking effectiveness, allow longer distances for stopping in rain, and drag your brakes occasionally to keep the water wiped off the rim.

Rain brings slippery roads and makes it necessary to go easier on turns and allow extra safety following distance. Other particularly slippery surfaces include tar spots, greasy spots, painted surfaces, plastic traffic dots, and metal in obstables like drain grates, manhole covers, and railroad tracks. If possible, avoid these hazards, especially on turns. If you must go through a slippery spot, go through in as straight a line as possible. Never assume that a motorist sees you.

2. Rules for Riding at Night

Do not ride a bicycle at night if you do not have to. If you must ride at night, here are some rules that will reduce your risk of accidents:

1. You should use lights that are clearly visible from the front, sides, and rear. Your lights should function when the bicycle is moving slowly or stopped. This could be particularly important in the event you have a spill at night. Also, get lights which illuminate the road as well as yourself.

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2. Be thoroughly familiar with the controls on your bicycle. Because you will not be able to see the shifting levers, you must know where they are by touch.

3. Slow down. A cyclist who proceeds at the same speed as he would during the daytime risks an accident caused by debris and holes which are much harder to see at night.

4. Ride only over streets that are familiar to you. Riding at night over terrain that you have never seen during the day is dangerous. An exception to this rule may be warranted in a group ride with a leader who knows the riding surface.

5. Wear white pants or a white jacket or shirt. White is the best color to wear at night. Inexpensive white cotton pants can be found at stores that sell uniforms to doctors, nurses, and medical technicians.

6. Have reflective material that is visible to the front, sides, and rear. Apply reflective tape to your helmet, clothing, and bicycle frame.

7. Comply with all legal requirements in your state. You must at least have a white light on the front and a red reflector on the rear. In most states, these devices must be attached to the bicycle. Be sure to use any additional lights or reflectors that may be required.

8. Be extra cautious about children and animals darting out in front of you. Remember, you cannot see obstacles as well at night.

9. Ride defensively. Do not expect anyone to see you. Do not take chances with cars looking like they are about to do something--let them make the first move. Your senses are not as effective at night. Also, there may be bicyclists and motorists out there without lights. They can turn up unexpectedly.[1]

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[1]Edward F. Kearney, "Rules for Riding at Night," L.A.W. Bulletin. (n.p., n.d.), n.p.

E. Class V

1. Ride - Heavy Traffic

All cyclists should retain a healthy respect for motor vehicle traffic; however, many cyclists have unreasonable and unwarranted fears of riding in traffic. Although roads with light traffic will always be preferred by cyclists, it is essential, if a bicycle is to become a true transportation vehicle, that cyclists learn how to handle high traffic situations because they cannot always be avoided.

Explain to students that the same safety rules apply when riding in traffic; however, cyclists must be more alert. Increase students' confidence by practicing the same turning drills as were practiced in lower traffic areas. Practice lane changes often. Stress that it may no longer be possible for the entire group to stay together. Each bicycle is now a vehicle in a stream of other vehicles and must maneuver separately. Stop often to comment or criticize and offer encouragement. Stress that the only way to develop confidence in traffic is to practice.

2. Changers

<u>One- and Three-Speeds</u>

Discuss different shift mechanisms and hub arrangements. Demonstrate how to realign gearshift lever or twist grip. Show how to adjust hub bearing. Advise students about regular lubrication of hubs.

<u>Derailleurs</u>

Demonstrate derailleur adjustment on your bike.

3. Conditioning

Explain the conditioning process to students. Emphasize the need to increase strength and endurance simultaneously. In addition, discuss the importance of diet for proper conditioning. Review Paul de Vivie's "Seven Commandments" (page 77).

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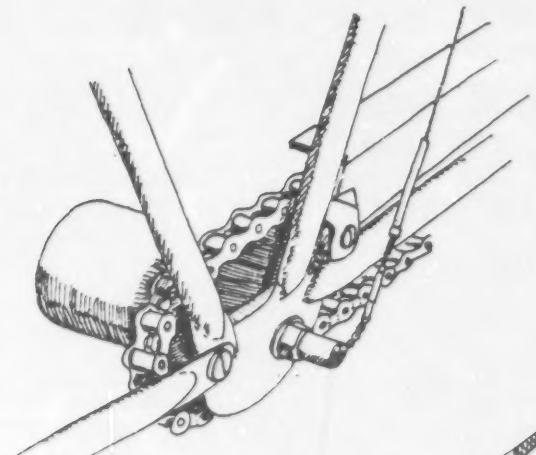
Student Handout: Changers

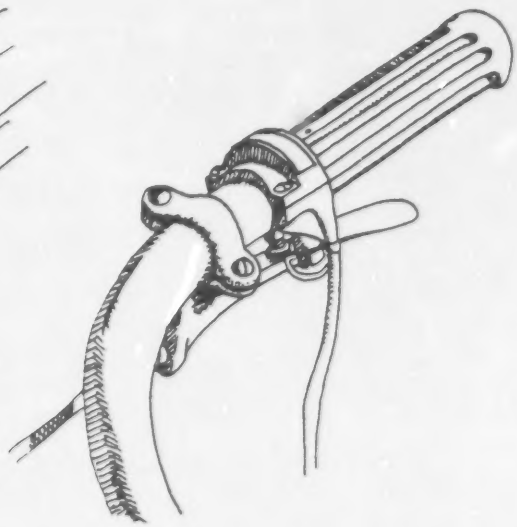
Gears: One- and Three-Speeds

Gears allow you to fit your pedal speed and pedal pressure to the steepness of terrain, the load of the bike, the resistance of the wind, or the desires of the rider. The hub gearing system can be found in two, three, four, five, and six-speed units. Some of these rear wheel hub units, especially on two-speeds, are combined with a coaster brake. In the two-speed, the gear shifting is accomplished by back pedaling. One basic rule of the three-speeds is that the cyclist should never shift while pedaling forward. Shifting should occur while the bike is moving, but freewheeling.

The single speed has a somewhat larger front sprocket than the one on the rear hub. If the front chainwheel was replaced by a larger one or the rear sprocket by a smaller one, greater pedaling effort would be needed but a higher gear would result. If the gear sprocket is too large, it becomes too difficult to turn; if too small, the cyclist would have to pedal too fast to propel himself forward.

Whether the bicycle has twist grips, shift gears, or a lever, the three- and certain five-speed models are cable controlled within the rear hub. Adjustment problems due to cable stretch represent the biggest problems for cyclists.





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The majority of all three-speed hubs are made by Sturmey-Archer AW (wide ratio), Sturmey-Archer TCW (combining three-speed mechanism with coaster brake), and Shimano 3.3.3.

The Sturmey Archer AW and TCW hubs have gears that are synchronized at the factory with the shifting lever or twist grip. The procedure to realign the gearshift lever or twist grip with the position of the gears in the hub is to first set the gear speed indicator on the shifter at N. or II on the mid-range mark. Second, release the lock nut, screw the cable connector at the rear wheel until the end of the indicator rod is exactly aligned with the extreme end of the axle (as seen through the "window" in the right hand nut). Then, retighten the lock nut.

The hub gear makes adjustment of hub bearings somewhat different from that on a derailleur bicycle. If the wheel is loose and the rear axle nuts are tight, the bearing adjustment should be tightened. To tighten the bearing, loosen the lock nut on the left side of the hub, adjust the left bearing cone, then retighten the lock nut. Basic maintenance of the Sturmey-Archer hub should start by making certain that the indicator is even with the axle when the shifter is in normal range as previously described. Also, oil the hub through the opening in the hub shell. This should be done every hundred miles or so with a good grade of bicycle oil. In addition, you should occasionally oil the cable housing at the handlebar control end and the trigger control for bikes that have trigger controls. If all these actions fail to adjust your bicycle, you should take it to a bicycle mechanic.

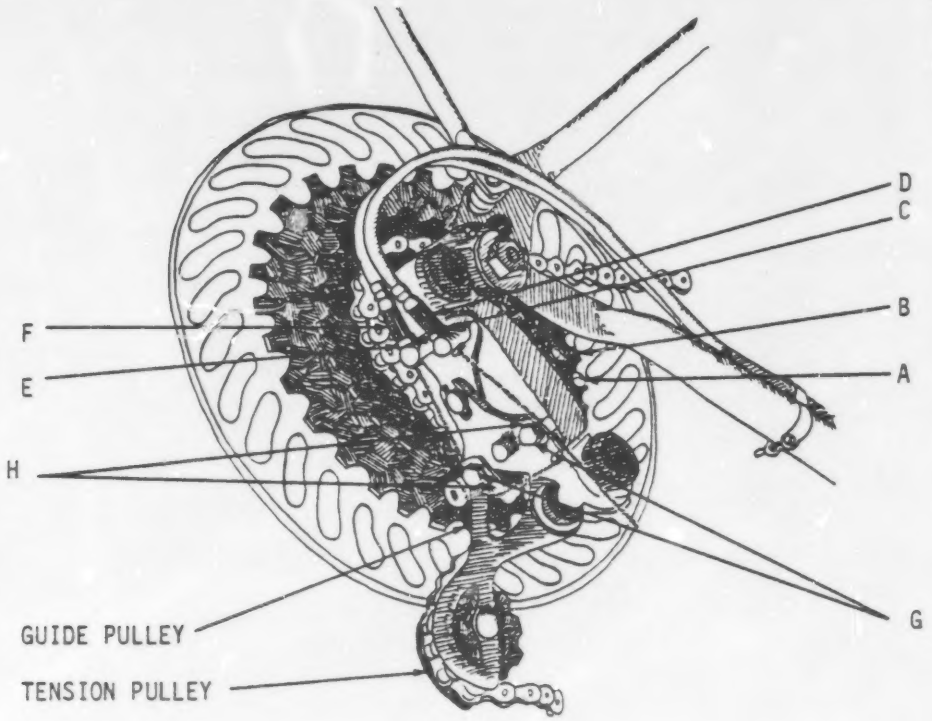
The Shimano 3.3.3 hubs have a twist-grip shifter with the grip labeled L, N, and H. To adjust, set the twist grip to N. If the arrow on the hub does not point to the vertical line on the cap nut, release the lock nut on the cable and rotate the knurled joint until the arrow points correctly. Once the adjustment is completed, tighten the lock nut.

If the Shimano has a loose wheel, follow instructions for the Sturmey-Archer except adjust the right-hand cone on the sprocket side (opposite from the Sturmey-Archer hub). Oil the Shimano like the Sturmey-Archer hub. Other three- and five-speeds will be adjusted and maintained in the same manner as the Sturmey-Archer and Shimano.

Derailleurs

The derailleur moves the chain from one sprocket to the next on five-, ten-, and fifteen-speed bicycles. Some bicycles carry up to six sprockets on the rear wheel and one, two, or three chainring sprockets at the pedals. Eight percent of all American bicycles and many foreign models are equipped with the Huret Allvit, Shimano, or Schwinn-approved derailleurs. This section covers two different derailleur systems. There are several additional types of derailleurs that your bike might have.

To adjust the Shimano derailleur, you must turn the bicycle upside down or you must have a bicycle stand that raises the rear wheel off the ground. If the problem is that the chain jumps off the small high gear, turn screw A to the right, or in. If the chain jumps off the large low gear, turn screw B to the right, or in. If the chain does not move onto the small gear, turn stop screw A to the left, or out. If this does not remedy the adjustment problem, the cable must be adjusted. To adjust the cable, loosen lock nut C



SHIMANO DERAILLEUR

and turn adjusting screw D to the left, or out. After the shift is made, tighten lock nut C and set stop screw A. If the cable adjustment does not take up enough cable, see the explanation below.

If the chain will not move onto the largest gear, turn stop screw B to the left or out. If this does not solve the problem, the cable must be adjusted. To adjust the cable, loosen lock nut E and turn adjusting screw F to the left or out. When the shift is completed, tighten lock nut E. Next, set stop screw B as above. If this does not take up enough cable, set the shifter control so that it is centered between high and low. Next, loosen cable clamp screw G. While turning the pedals, push derailleur by hand into a position behind the middle gear so that the chain has shifted to this gear and runs quietly. Turn screws D and F completely down. Both cables should be outside the screws G and under the chain H. Next, pull one cable snug but not tight enough to move the shifter. Hold the cable tight while tightening screw G. If the shifter is centered, pull the other cable tight and secure the other screw G.

If the chain cage is not in line with the front chain wheel, the front derailleur needs adjustment. To adjust, loosen the frame clamp nut A and B to align and then retighten. The left control lever should be moved forward, then loosen lock nut C, move the derailing cage laterally to center it over the smaller chain wheel before tightening the lock nut. The curvature of the cage must be kept parallel to the chain wheel. The cage should be centered over the large chain by placing the left control lever back and adjusting the lateral movement by screw C. To adjust the front and rear Huret and Schwinn-approved derailleurs, the rear sprocket should be aligned with the derailleur rollers. If not parallel, the rear sprockets should be twisted to get the derailleur in position.

Several shifting problems can be corrected with simple adjustments. If the front or rear derailleur shifts by itself while you are riding, tighten the thumbscrew holding the shifting lever at the stem. If the rear derailleur will not shift into low gear, the cable may be stretched. Shift the lever all the way forward by shifting the unit to get into high gear. The cable can be pulled tight by turning the adjustment barrel. If more adjustment is needed on the adjustment barrel, loosen the cable anchor bolt nut and pull the cable through until it is almost taut. The cable

anchor bolt nut can then be retightened. If the front derailleur will not shift into high gear, push the left lever forward while turning the pedals. Next, loosen the cable anchor bolt nut, pull the cable through until about taut, then retighten the cable anchor bolt nut.

To readjust the entire derailleur system, shift front derailleur onto the small front sprocket. Turn the low-gear shifting screw until the chain guide is centered over the sprocket. In this position the lever should be all the way forward and the cable should be almost taut. Shift the chain onto the large front sprocket. Turn the high-gear adjusting screw until the chain guide is centered over the sprocket. Shift the chain onto the smallest rear sprocket. If the cable is not almost taut, readjust the cable, following the stretched-cable instructions above. If the guide cage is not centered over the chain and sprocket, turn the high-gear adjusting screw as needed. Shift the chain onto the largest rear sprocket. If the guide cage is not centered over the chain and sprocket, turn the low-gear adjusting screw as needed.

The derailleur should be cleaned by taking it apart and cleaning all the rubbing surfaces with a clean, dry rag. Use fine steel wool on the metal parts if you have to to get them clean. Any parts that are rusted or bent should be replaced.

Student Handout: Conditioning

In order to become a cyclist who can go long distances over rugged terrain, you must increase your strength and endurance. Riding at 80 percent of capacity will greatly increased the ability of muscles, heart, and lungs. Another way to increase strength is to punctuate normal cycling with bursts of all-out pace. Also, you can progressively ride farther and climb more grades on a day-to-day or week-to-week basis and gradually develop into a well-conditioned cyclist.

Whether or not you are well-conditioned, in warm weather you must worry about the loss of water and salt. If salt is not taken in sufficient amounts with water that you drink, cramps could develop. Gatorade, or similar drinks could act as a salt substitute.

Besides water and salt, certain foods are needed for energy. Things like bananas, raisins, candy, and soft drinks can provide quick energy. However, proper eating at all times is better then the occasional quick energy snack.

When you are taking a strenuous biking trip, it is often important to drink before you are thirsty, eat before you are hungry, and take the right amount of salt for water retention. You should take care to avoid non-buffered salt tablets.

Paul de Vivie, an outstanding cyclist, wrote Seven Commandments for the cyclotourist. They are:

1. Take short and infrequent rests so that you do not interrupt the rhythm.
2. Eat lightly but frequently. Eat before you become hungry, and drink before you become thirsty.
3. Never continue until abnormal fatigue manifests itself by lack of appetite and the inability to sleep.
4. Cover yourself before becoming cold. Uncover before becoming hot. Don't be afraid to expose your skin to sun, air, and water within reason.
5. Eliminate, at least on the road, alcohol, meat, and tobacco.
6. Never force yourself. Ride within the body's reserves, especially during the first hours of the day, when your energy seems inexhaustible.
7. Do not force the pace or ride just to prove yourself.

E. Class VI

1. Ride - Emergency Maneuvers

Class VI should emphasize emergency defensive maneuvers. These maneuvers are relatively difficult and require considerable practice. This lesson should be conducted in a large empty parking lot so that students can practice each exercise safely. You should demonstrate each maneuver several times at normal speed. Students should then practice each maneuver starting very slowly and progressing as their confidence increases. Encourage students to wear helmets, especially when they are practicing emergency maneuvers. Teach the following maneuvers:

a. Panic Stops

Demonstrate at slow speed the effect of using the front brake alone (weight transfer and rise of wheel) and the rear brake along at a faster speed (skid). Then demonstrate correct stopping procedure (page 80) slowly several times, then at proper speed. Have students try at low speed.

b. Instant Dodges and Turns

Demonstrate dodging using a foam block as an obstacle. Emphasize steering toward the hazard, then away from it to recover. Demonstrate veers to left and right. Have students practice dodge using a foam block. Begin with gentle weave around obstacles, then speed up. After students have practiced this maneuver, introduce instant turns by following same procedure without the recovery. Emphasize that braking and instant turns must often be combined in emergency situations.

c. Curb Hopping

Mention and demonstrate, if possible, the proper technique for hopping railroad tracks, small potholes, or curbs by lifting up each wheel over obstacle while going slowly. This maneuver can be accomplished by pulling up with the arms and legs; however, it can only be done by those who use toe clips. This technique will lessen rim damage.

2. Gears

Describe proper shifting procedure. Show students how to calculate gears, explain what gear size means, and describe the use of a gear table. Have each student calculate his gears.

3. Commuting

Encourage commuting by emphasizing the advantages and the ease of commuting. Help students find solutions to the first objections to commuting such as clothing problems or bike storage problems. Have students plan a sample route between two well-known spots in the area to show the kinds of roads that are suitable for commuting. Devote some discussion time to the style of bicycle which is most appropriate for commuting.

4. Bicycle Security

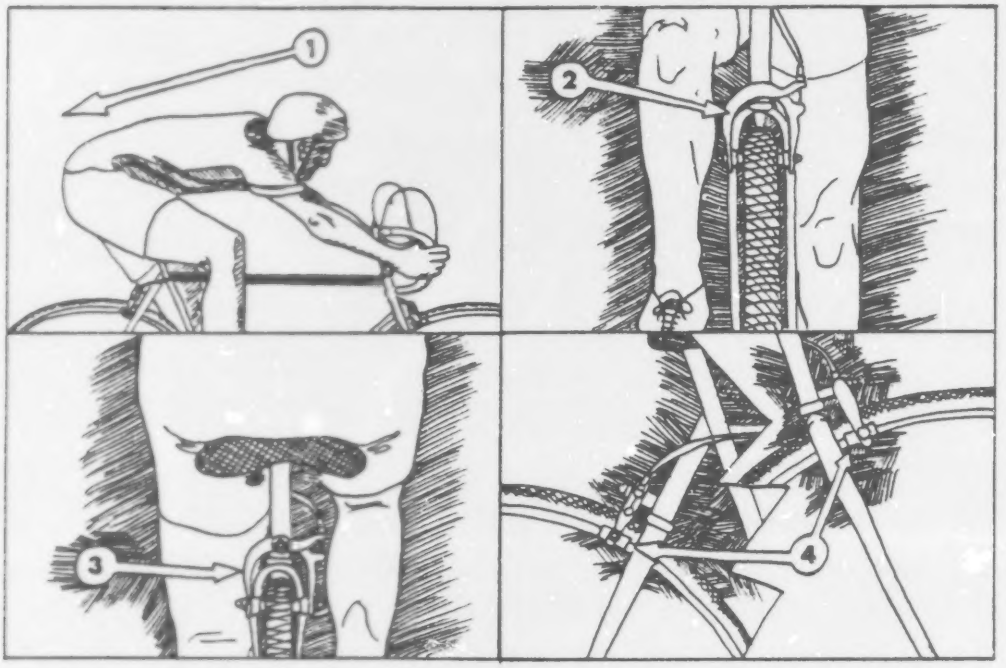
Demonstrate how to lock a bike safely. Show examples of Citadel and Kryptonite locks. Introduce students to bike lockers and storage facilities. Hopefully, sutdents can be motivated to campaign for more and better bike parking facilities in your town.

Student Handout: Emergency Maneuvers

To stop quickly: (1) Slide back on the seat and use the fro. brake as hard as is safe. (2) The front brake should be applied harder and harder until the rear wheel starts to slide, then apply the rear brake gently. (3) Ease off the front brake. The force on the front brake should be approximately three times that on the rear brake. However, using the front brake alone is dangerous; using the rear brake alone causes skids. (4) Therefore; always use both front and rear brakes.

Slide Back on Seat

Apply Front Brake



Apply Rear Brake

Apply Both Brakes

When dodging rocks, go straight for the rock until you are very close to it. Then, without leaning over, turn the handlebars suddenly so that your front wheel dodges around the rock. If you dodged to the left, you will begin to fall to the right. As soon as your wheels have passed the

rock, you should catch yourself by steering more right than normal. Your wheel has veered around the rock to the left, then from left to far right so you could catch yourself, then it straightens up. Your body and handlebars should have barely moved.

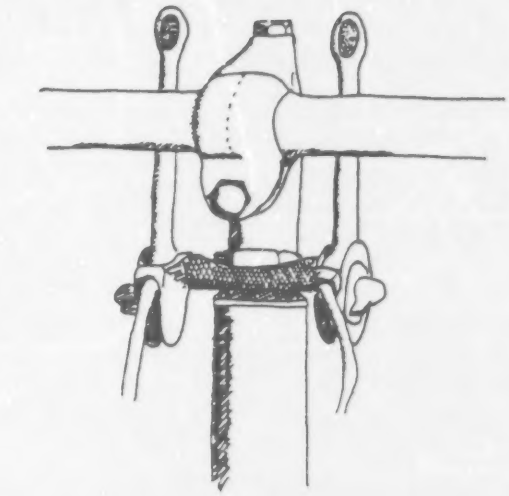
The instant turn involves the rock dodge without the recovery. You turn your front wheel toward the object to be avoided, which starts a lean in the opposite direction. About 1/10 of a second after you have started the lean, turn the front wheel in the direction of the lean and you will have a tight turn.

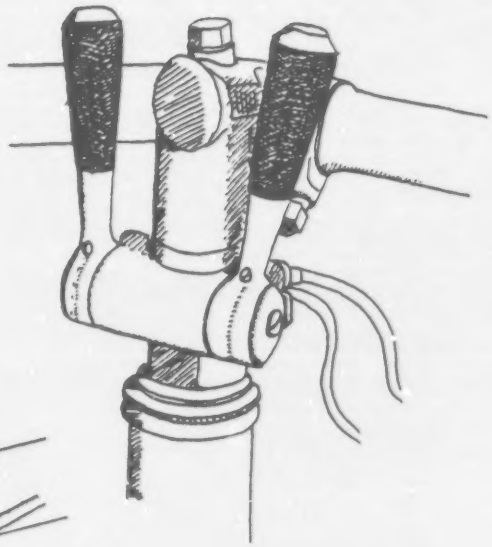
There are other potentially hazardous situations on the road that you should know how to handle. If you cannot dodge a chuck hole or railroad tracks, brake hard to slow down. The slower your speed, the more time your wheel has to climb over the edge and the less time the tire will be flattened. If possible, especially on railroad tracks, look for the flattest place.

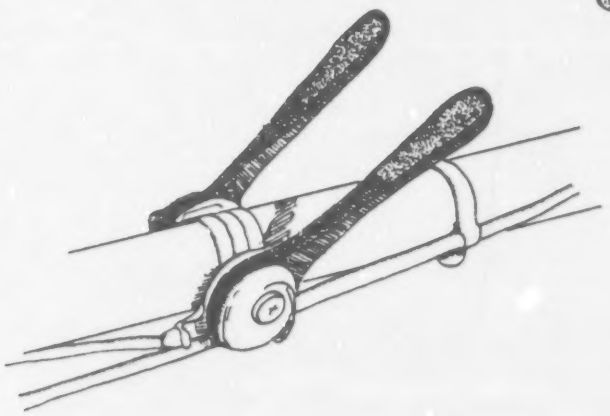
When you approach a sharp edge and you cannot dodge, you should stop pedaling with your pedals horizontal and lift yourself off of the saddle. Try to relax your arms and legs so that your bike rides over the bump. If you cannot dodge or slow down, perform this motion with a sharp jerk and use your handlebars and toestraps--if you are wearing them--to jump over the edge. Make every attempt to get the front wheel over, and hope the back wheel gets over.

Student Handout: Gear Selection

Selecting a gear system is a personal decision--preferences vary widely. Select a system which has a high gear that does not make you wish to pedal faster, a low gear that makes you comfortable on steep climbs, proportionally spaced gears between an adequate number of gears, and a shift pattern that is easily remembered. Gear selection varies with the type of riding and terrain.







Gears are measured in inches, equivalent to riding a high-wheeler whose wheel is that many inches in diameter. To figure out how far you go per pedal stroke, multiply the gear (in inches) by Pi (3.14). If you multiply this distance by your cadence (pedal rpms) you can calculate your speed and the distance travelled.

To calculate your gears, use the following formula:

Gear = Wheel Diameter X Chainwheel Size ÷ Rear Sprocket Size. You should calculate your gears to make sure that none are duplicates. If you have any duplicates, you have fewer gears than you thought. You can change gear patterns on a good ten-speed by changing chainring and freewheel sizes.

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GEAR CHART FOR 27" WHEEL

Teeth Per Rear Sprocket	Number of Teeth, Chainwheel (large front sprocket)																						
	24	26	28	30	32	34	36	38	40	42	44	45	46	47	48	49	50	52	53	54	55	56
12	54.0	58.5	63.0	67.5	72.0	76.5	81.0	85.5	90.0	94.5	99.0	101.2	103.5	105.7	108.0	110.2	112.3	117.0	119.3	121.5	122.7	126.0
13	49.8	54.0	58.1	62.3	66.4	70.6	74.7	78.9	83.1	87.2	91.4	93.4	95.5	97.6	99.7	101.8	103.9	108.0	110.0	112.1	114.2	116.3
14	46.2	50.1	54.0	57.8	61.7	65.5	69.5	73.3	77.1	81.0	84.9	86.7	88.7	90.6	92.6	94.5	96.4	100.3	102.2	104.1	106.0	108.0
15	43.2	46.8	50.4	54.0	57.6	61.1	64.8	68.4	72.0	75.6	79.2	81.0	82.8	84.6	86.4	88.2	90.0	93.6	95.4	97.2	99.0	100.8
16	40.5	43.7	47.2	50.6	54.0	57.2	60.9	64.1	67.5	70.9	74.3	76.0	77.6	79.3	81.0	82.7	84.4	87.8	89.4	91.1	92.8	94.5
17	38.1	41.2	44.4	47.6	50.8	54.0	57.2	60.3	63.5	66.7	69.9	71.5	73.1	74.6	76.2	77.8	79.4	82.6	84.1	85.7	87.3	88.9
18	36.0	39.0	42.0	45.0	48.0	51.0	54.0	57.0	60.0	63.0	66.0	67.5	69.0	70.5	72.0	73.5	75.0	78.0	79.5	81.0	82.5	84.0
19	34.1	36.8	39.7	42.6	45.5	48.2	51.1	54.0	56.8	59.7	62.5	64.0	65.4	66.8	68.2	69.6	71.1	73.9	75.3	76.7	78.1	79.5
20	32.4	35.1	37.8	40.5	43.2	45.9	48.7	51.3	54.0	56.7	59.4	60.8	62.1	63.4	64.8	66.2	67.5	70.2	71.5	72.9	74.5	75.6
21	30.8	33.4	36.0	38.6	41.1	43.7	46.4	48.9	51.4	54.0	56.6	57.9	59.1	60.4	61.7	63.0	64.3	66.9	68.1	69.4	70.7	72.0
22	29.4	31.9	34.3	36.8	39.2	41.6	44.2	46.6	49.1	51.6	54.0	55.2	56.5	57.6	58.9	60.1	61.4	63.8	65.0	66.2	67.5	68.7
23	28.1	30.5	32.8	35.2	37.5	39.8	42.4	44.6	47.0	49.3	51.6	52.8	54.0	55.2	56.3	57.5	58.7	61.0	62.2	63.6	64.5	65.7
24	27.0	29.2	31.5	33.7	36.0	38.2	40.5	42.8	45.0	47.3	49.5	50.7	51.8	52.9	54.0	55.1	56.3	58.6	59.6	60.7	61.8	63.0
25	25.9	28.0	30.2	32.4	34.6	36.7	38.9	41.0	43.2	45.4	47.5	48.6	49.7	50.8	51.8	52.9	54.0	56.2	57.2	58.3	59.4	60.4
26	24.9	27.0	29.0	31.2	33.2	35.3	37.4	39.5	41.5	43.6	45.7	46.7	47.8	48.8	49.9	50.9	51.9	54.0	55.0	56.0	57.1	58.1
27	24.0	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40.0	42.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0	52.0	53.0	54.0	55.0	56.0
28	23.1	25.0	27.0	28.9	30.8	32.8	34.8	36.6	38.6	40.5	42.4	43.4	44.4	45.3	46.3	47.2	48.2	50.1	51.1	52.0	53.0	54.0
29	22.4	24.2	26.1	28.0	29.8	31.6	33.5	35.4	37.2	39.0	41.0	41.9	42.0	43.8	44.7	45.6	46.5	48.4	49.4	50.3	51.2	52.1
30	21.6	23.4	25.2	27.0	28.8	30.6	32.4	34.2	36.0	37.8	39.6	40.5	41.4	42.3	43.2	44.1	45.0	46.8	47.7	48.6	49.5	50.4
31	20.9	22.6	24.4	26.2	27.9	29.6	31.4	33.1	34.8	36.6	38.3	39.2	40.1	41.0	41.8	42.6	43.5	45.2	46.2	47.0	47.9	48.8
32	20.3	22.0	23.6	25.3	27.0	28.7	30.4	32.1	33.7	35.4	37.2	38.0	38.8	39.7	40.5	41.4	42.2	43.9	44.7	45.5	46.4	47.3
33	19.6	21.3	22.9	24.6	26.2	27.8	29.5	31.1	32.7	34.4	36.0	36.8	37.6	38.5	39.3	40.1	40.9	42.6	43.4	44.2	45.0	45.9
34	19.1	20.6	22.2	23.8	25.4	27.0	28.6	30.2	31.8	33.3	35.0	35.7	36.5	37.4	38.1	38.9	39.7	41.3	42.1	42.9	43.6	44.5

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Student Handout: Commuting

The first thing you, as a potential commuter, must do is to select the route. In making this route selection, you should be most concerned with safety. Your best route will probably have the fewest stops and slowdowns. Since commuting is usually done at peak traffic hours, the best route is usually on side streets whenever possible. It is better to go a little out of your way than to travel in heavy traffic.

There are many suggestions that commuters might follow:

1. Be ready for all types of weather. Watch the weather reports in order to be informed.
2. Be able to carry whatever tools you need and/or know where to get them along your route.
3. Have your bicycle ready for night-riding.
4. Have a good, dependable bike.
5. Make sure the gear selection is adequate for the ride.
6. Use good tires and avoid skidding the rear tire when braking because this removes a lot of rubber.
7. Make sure your bicycle is secure and sheltered from weather if possible.
8. Either wear clothes that can be suitable for bicycling, or carry clothes that you can change into after commuting.
9. Wear light colored clothing or bright warm colors. Also, a bicycle flag will help to increase your visibility.
10. Encourage your employer to provide secure bicycle parking facilities and a place to change clothes. Maybe you can even get a shower and locker.
11. Promote commuting by bike to your co-workers, especially those living near you. Riding with a buddy is more fun than riding alone, and it is helpful in an emergency.
12. Try to ride the same route at the same time every day. This way, you have uniform traffic conditions and learn how to adjust to them. An added benefit is that the same motorists see you every day and learn to accommodate you.

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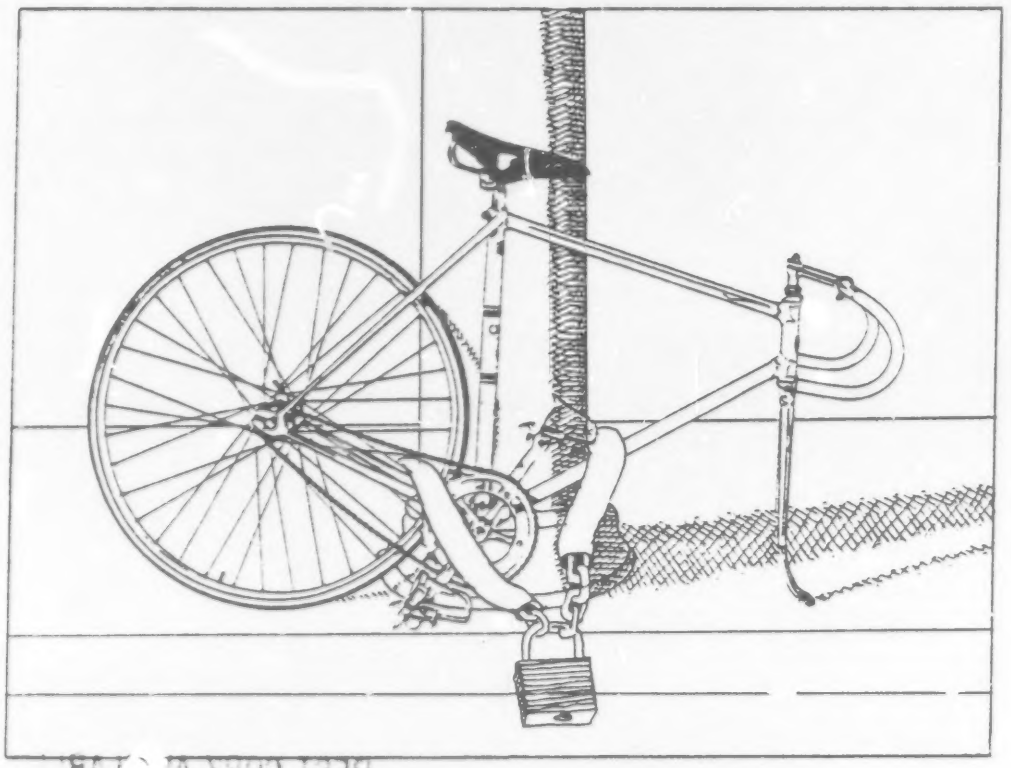
Student Handout: Bicycle Security

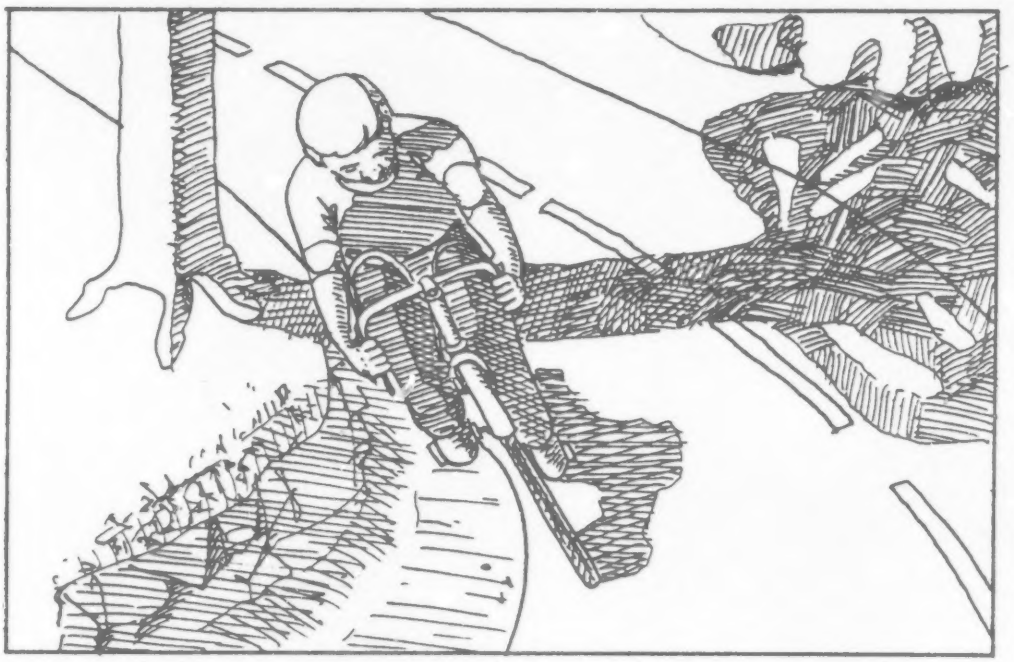
Bicycle theft has reached huge proportions in this country. Therefore, whenever you leave your bike unattended, attach it to an immoveable object with a case-hardened three-eighth-inch chain. Some good locks include the Citadel and the Kryptonite. To lock your bike, put the chain through both wheels and frame; otherwise, the wheels might be removed. In addition to always locking your bicycle, you should register it with the police department so they can trace it if it should be stolen. Another possibility, when commuting to work or to places where you will leave your bike, is to buy an old bicycle with unfashionable parts so that it will not be attractive to bicycle thieves. However, the best security is to keep your bicycle inside whenever possible, or at least take your front wheel wherever you go.



G. Class VII

1. Ride - Hills

Students must be familiar with gearing, climbing pedal action, and fast cornering techniques. Emphasize the need to shift down before they feel strained in order to maintain pedal speed. It is also important to shift down before slowing on hills. It is necessary for the student to select the gear at which he can best complete the climb at a steady pace or cadence. The correct pace should be selected by estimating the speed at which the cyclist can complete the climb. Also, try to show the advantages of ankling.



As well as discussing hill climbing, the cyclist must emphasize proper cornering and braking on curves. This involves braking before the curve rather than while turning. Braking in the apex can cause loss of friction and can cause a crash. In braking before curves, one should

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lean sufficiently into the curve in relation to speed. To develop the proper lean, the cyclist should steer toward the outside of the turn for a moment and then begin to lean. The cyclist should use the whole width of the lane to make the curve gradual, but he should not go into other lanes. Point out that since the cyclist will probably be going at least as fast as the speed limit down hill, he has every right to use the whole lane.

Point out riding technique for climbing long hills. The cyclist should put his hands atop the bars so that his body will be more upright for easier breathing. He should concentrate on regular breathing, and forget about problems and slowness. It may be helpful to just think about scenery and daydream to get mind off hill. For short hills, pulling on bars and "stomping" out of saddle is recommended so as not to lose speed. The cyclist should change position in and out of saddle, using high gears sometimes when "walking" up hill for variety. The cyclist should rest at the top, not part way up. In mountain terrains, advise students to have a jacket to put on before long descents to prevent a chill. Also point out that lots of small hills add up and may be more tiring than a long hill. The total distance climbed, not the net elevation gain or loss, is the measure of climbing that has been done.

2. Touring

For many students, this course may provide the first introduction to touring. You should encourage all students to try touring. Express the pleasures of touring enthusiastically.

Introduce students to the range of touring possibilities, things such as day rides, riding from hotel to hotel, and camping on the roadside.

Explain the need to plan carefully before a tour of any length. Route selection should be done carefully, not only to pick the best roads for riding but also to select a route with varied scenery. As an exercise, have students plan a tour of a specified length from the classroom site. Perhaps some students may wish to actually take this tour together on a Saturday.

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Help students list equipment which they should take on a tour. Demonstrate packing techniques and types of carriers available.

3. Bike Clubs

Introduce students to the activities of bike clubs. Either recommend bike clubs in the area (see Appendix A) or discuss how clubs can be organized.

4. Chain and Freewheel

Demonstrate how to put the chain on a bicycle. Show how to clean and lubricate the chain properly. Show how to tighten or loosen a chain to the proper tension.

Tell students about the need to replace worn chains. Demonstrate chain removal and replacement.

Discuss freewheel maintenance and replacement. Remove freewheel from your bike. Warn students about stripping the freewheel.

Student Handout: Touring

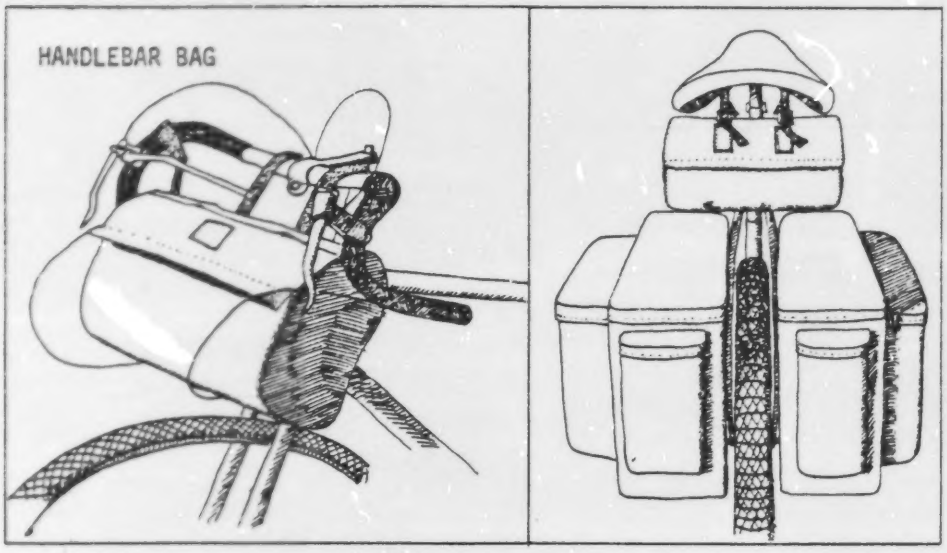
Touring can be a great adventure for a bicyclist since it combines the pleasures of sightseeing with the fun of cycling. Touring can take the form of staying at a resort and going out for day rides; travelling on bike from hotel to hotel every day or every few days; staying at a hostel, or cooperative dormitory, where cooking equipment, washing facilities, and sleeping space are provided; or simply camping on the roadside. In any of these forms, touring can provide a great vacation since it can be done at whatever pace suits the group members. However, touring is at its best along secondary, less travelled roads with varied scenery.

Careful planning is essential if a tour is going to be pleasurable In the first place, touring is safest and most fun with a group of cyclists. In fact, touring should not be attempted alone unless the cyclist is experienced and in reasonably good shape. A sturdy, dependable bicycle is another essential ingredient for an enjoyable trip.

Before undertaking a trip of any length, the bicyclist should have maps with scales between 2 inches and 1/4 inch per mile. Maps at these scales are usually published on a county basis and are available from the state Department of Transportation. In addition to county maps, there are a few maps published specifically for cycling. For example, the North Carolina Bicycle Program has an excellent set of maps available for crossing North Carolina on the Bicycle Highways. Also, the Bikecentennial Cross- U.S. maps and the League of American Wheelmen provide a variety of touring maps. Good "metropolis and vicinity" or "regional" maps may be available in some areas. In some instances, larger scale maps may be helpful in planning trips but they are too bulky to carry around. To be worth their weight, maps must provide a diagram of the road including the climbs, the distances between rest stops, the distance between recognizable points, and the amount of traffic in relation to road size.

Clothing taken on a trip should be suitable for conditions expected, the length of the trip, and the carrying capacity of the cyclist. Because of limited carrying capacity, clothes taken should have multiple uses.

Luggage carriers haul the load, front and rear, and vary considerably in rigidity, size and weight. A variety of carriers that can attach to many parts of the bike are available. Pannier bags, saddlebags, and handlebar bags provide many alternatives to the cyclist. Back packs should be



avoided because they make it difficult for the cyclist to keep his balance. The cyclist should let the bicycle carry the weight and keep the center of gravity low. Most experienced bicyclists carry from 30-50 pounds. This amount varies depending on the length of the trips, the capacity of the rider and bicycle, and type of trip planned. When the bicycle is loaded, the weight slows the cyclist down on hills and in acceleration. When the bicycle is loaded, lower gears will be needed on hills and stopping will require greater distance. Also, the bicycle will have a tendency to sway more when fully loaded. Practice is needed to carry a load safely.

It is essential that heavy items be placed as low as possible in the panniers and that the load be distributed between the front and rear bags. Too much weight over the front wheel will adversely affect handling,

but some weight is necessary to maintain proper traction with the front wheel. Only experimentation can provide the correct ratio. Several short "shake-down" trips should be made to provide this type of information to establish the proper set up of the touring cycle.

Regardless of the tour, it should be planned well to minimize unforeseen difficulties. For example, tools should be taken to repair any unexpected problems with the bike. No tool list is appropriate for every bike. However, as a general rule, cyclists should not take big wrenches for headset, bottom bracket, or freewheel remover, because they are too heavy. If a problem occurs, the cyclist can stumble to a place to borrow these tools. Cyclists should always take tools for wheel repair, tire repair, chain repair; cotterless cranks; and lubricants.

Student Handout: Bike Clubs

To get the most from this course and from cycling, join or organize a bike club. Bicycling clubs are a means to have companionship on the road while learning more about the bicycle. Riding with a bicycle club can decrease the time it takes to learn to ride your bicycle. Also, cycling clubs can serve as a vehicle to get cyclist views before government.

To find a cycling club, check at the local bike shop or the local recreational department. You could also write to the national League of American Wheelmen which publishes a list of clubs and members.

There are two principal types of clubs, racing and touring. However many clubs accommodate both types of riding. To join a racing club, you need to be in good physical condition with good bicycle conditioning and skill development. Many times such a club exists to race and the meetings are principally training rides. Examples of bike clubs include camping or touring clubs, clubs for commuting cyclists, clubs for singles, clubs for families, beginners' clubs, or any number of special type clubs. However, one club in an area may accommodate all of these.

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Student Handout: Bicycle Club Organization

To organize a club, study the area. Along with bicyclists in your neighborhood, plan a bike meeting. This could be a social in someone's home or in a public building. A bicycle meeting should be characterized by everyone bringing his bike, either riding it or hauling it in. A bike ride should be a part of most meetings.

Here are a few suggestions for starting a bike club:

1. Announce the meeting by card, letter, or phone call. Send announcements to all known bicycle enthusiasts in the area.
2. Give a press release out to newspapers, television, and radio.
3. Find a good talker to chair the meeting, one who is positive with people and who understands exactly what you are trying to do.
4. A chairman for any projects should be elected or appointed.
5. Develop a constitution and by-laws (sample enclosed).
6. Develop membership forms.
7. Establish membership dues.
8. Appoint a secretary and treasurer.
9. Launch membership drive.
10. The president, at least, should affiliate with the League of American Wheelmen.
11. After the club is established, a monthly newsletter to do things such as announce meetings and disseminate information might be helpful.

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(Sample)

CONSTITUTION AND BY-LAWS

ARTICLE I

Name and Colors

Name -
Colors - a non-profit corporation.

ARTICLE II

Aims

Promotion of cycling and hosteling. Encourage recreational cycling activities.

Promotion of public recognition of the need for safer cycling conditions.

Promotion of public facilities for cycling and hosteling.

Promotion of cooperation with public authorities in the observance of all traffic regulation by cyclists.

ARTICLE III

Membership

Section 1. Regular member minimum age limit 16 years. Family membership available on request

Section 2. Applicant shall be elected by a majority vote at any regular vote at any regular meeting. Should application be rejected, fees will be returned.

ARTICLE IV

Dues

Annual dues payable April 1. By July 1, non-paying members will be dropped.

Individual Membership - XXX (usually around $5.00)
Family Membership - over 18 and under 16, ___ per member

Parents or guardians signature are necessary for approval of membership of persons under age 21.

ARTICLE V

Officers

1. Elected annually first week in July.

2. Elected officers and committee chairmen shall constitute Executive Board.

3. President - presides, appoints committees (with approval of Board). Answers for Club in all matters.

4. Vice President - assumes President's functions in his absence.

5. Secretary - keeps minutes, membership records, handles correspondence, subscriptions, notices.

6. Treasurer - responsible for finances, fund raising plans, and budget planning, collects dues, and makes financial report.

7. Road Captain - Chairman's Tour Committee, in charge of all runs, supervises all runs. Substitutes for President or Vice President.

Student Handout: Chain and Freewheel

Chain

The most common problem with the chain on a bicycle occurs when the chain comes off the sprocket. To put the chain back on the sprocket, put the chain on the rear sprocket first. For ten-speed bicycles, the chain should then be threaded through the tension roller, the jockey roller, and over the smallest rear sprocket with the gear lever in high gear position. Next, press a couple of links down over the teeth of the front sprocket. While holding those links on the sprocket teeth, (rear wheel must be off the ground) crank the pedals forward. The rest of the chain should pop onto the sprocket. Derailleur may need adjustment if chain comes off often on largest or smallest sprocket of rear cluster.

If the chain is gunk-covered, use a solvent such as kerosene to either soak the chain or wipe the chain with a rag. To oil the chain, crank the pedal slowly and let the oil (some use WD-40) get on every roller. You need a small repetitive drop on every roller. However, don't over oil, because excess oil will pick up grit. Cleaning and oiling can probably be done best if the chain is off the bicycle.

On a one- or three-speed bicycle, if the chain is loose, loosen the big axle nuts that hold the rear wheel to the frame. Pull the real wheel back in the frame, and when the chain is tight, tighten the right axle nuts. Once this is done, you should align the wheel so the rim is in the middle of the chain stays, then tighten the left axle nut. If the chain is loose on a ten-speed, you can take a link out of the chain.

A chain can also be too tight in two ways. First, it may have a tight link. This often happens when you take a chain apart and put it together again. Find the tight link, and first attempt to work out the problem with oil. If this does not work, slightly loosen the link with a chain tool or with the blade of a screwdriver. Then add oil. If the link is still tight, the link must be replaced. Another problem may be that the chain has too few links. Using a chain tool, take the chain apart and attach a new link. Reconnect the chain and check to see if the new link is too tight. If so, fix as above.

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After a year or two of average use the bicycle chain will wear out and quit riding smoothly. If the bike is a one- or three-speed bike, undo the master link, take off the old chain, put on the new chain, and attach at the master link. On the ten-speed, get a little longer

chain than you think you need (a few links may have to be removed), thread it as mentioned earlier, then using the chain link extracting tool, attach ends. The chain should be oiled at replacement.

To remove the chain from the bicycle, a rivet extractor is required. Back out the punch by turning the tool handle counterclockwise. Next lay one of the links of the chain over the flanges, aligning the rivet with the punch. By turning the handle clockwise, push the rivet almost completely out. Leave approximately 1/32 of the rivet holding the chain roller. Carefully take the chain apart being careful not to let the rivet slip out of the chain. When replacing the chain, six complete turns of the handle, once the chain is firmly against the rivet, is one method of gauging how far to push the rivet. Then back out the punch and remove the tool.

Sprockets

The toothed wheels on the back wheel to which the chain is attached are called sprockets. The assembly of sprockets is called the freewheel cluster, or freewheel. The toothed wheel on the front which is attached to the cranks is called the chainwheel. It is possible that the chain will wear out the freewheel or the sprocket. If either is worn or broken, they must be replaced. Also, a new chain may consistently slip off on old freewheel with worn teeth or chainring or a new freewheel or chainrings will cause problems with an old chain. Sometimes all must be replaced if one is replaced. Usually the chain rings are unaffected.

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Often only one or two cogs of a freewheel are worn. These can be replaced after disassembling the freewheel once it is removed from the bike.

If the freewheel needs to be taken off, remove the rear wheel. Next, unscrew the big axle nut or wingnut or quick release conical nut at the right end of the axle. If your freewheel remover will not fit into place on the freewheel around the axle, you should get a thin spanner and put it on the left cone. Then, with another spanner or wrench on the spacer unit (just like a thin locknut), unscrew it off the axle. Put the remover so that either the splines are well engaged, or the two prongs are set all the way down in their slots on the freewheel. Place the big axle nut, or the conical quick-release nut (without its spring) back on the axle and screw it up to the freewheel remover. With a big wrench and a good grip on the remover, loosen the freewheel. Getting the freewheel loose can be very difficult. The big axle nut or the quick-release conical nut should hold the remover snug against the freewheel. Gradually turn the wrench harder. When it starts to turn, check to make sure the freewheel is coming loose and not stripping. When the freewheel comes loose, loosen the big axle nut or the quick-release conical nut and spin the freewheel off the hub. If the freewheel starts to strip, stop and take the wheel to a shop.

H. Class VIII

1. Ride - Touring

Of course, it is not possible to take a real "tour" during an hour-and-a-half ride; however, it is possible to take a short ride following the same procedures you would use on a tour. For this ride, prepare route sheets as you would do on a tour. Hand out route sheets and explain the route using a map.

Form those students with similar abilities into groups of three or four, riding at a moderate pace. Try to insure that the pace is kept constant. As students' proficiency increases, have students practice the art of changing leaders. Also, set rest points to stop and regroup.

Many classes may want to take a longer trip as part of the class. Class X has been left open to pursue topics of particular interest to the class, and a tour might be an appropriate class. See Class X for more information.

2. Headset Maintenance

Review method of checking for loose headset. Demonstrate tightening procedure. (This is discussed in detail in the handout on pages 101-102). Demonstrate headset overhaul. Point out that most students will probably want to leave this job in the hands of an expert mechanic.

3. Racing

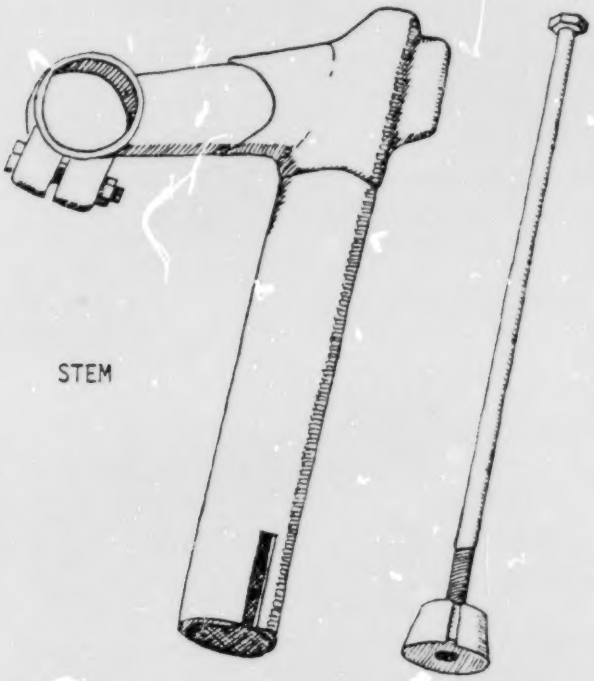
Discuss two major categories of racing--track racing and road racing--in some detail. Point out the enormous amount of conditioning required for racing. Discuss differences in racing bikes. Mention any bike races planned for your area. Explain that during the on-bike portion of the next class you will hold time trials for the class. Several excellent racing films are available. You may want to show one of these, particularly if students have not ever seen any racing.

Student Handout: Headset and Stem

Source: "Headset Maintenance" by Chuck Lewis, Carrboro, North Carolina.

The two basic functions of the headset are to provide a means to allow fork rotation, making the bicycle steerable, and to transmit road shock from the front to rear wheel without introducing harmful vibration into the frame's handling characteristics. It is the tightness of the fork bearing or lack of it that we are concerned with in proper headset adjustment.

To check your headset, stand astride your machine, grab the front brake lever with one hand and rest the other hand on top of the stem. With the front brake locked, rock the bicycle back and forth and be sensitive to any looseness that might be present in the headset. Looseness can be detected as a "knocking" sensation felt in the forks of your hand on the stem. Tightening your headset is the obvious cure, but how tight? The next step is to remove the front wheel and turn the forks from side to side. This is best accomplished if the bicycle is supported from a stand, wall hooks or the arms of a friend. The forks



STEM

HEADSET

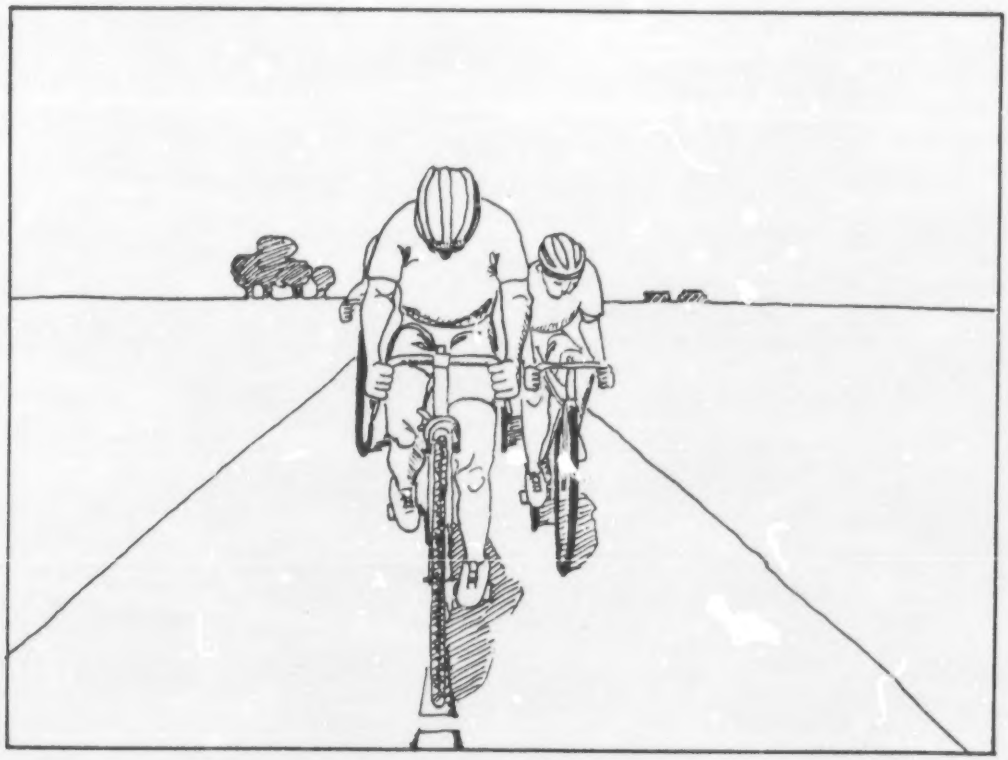
should turn freely with absolutely no binding or rough spots through 360 degrees of movement. If there is binding, then the headset needs to be loosened, but not so much that the looseness mentioned earlier occurs.

Two other problems may present themselves at this point. The first problem occurs when the headset is tight at one spot, but loose in another. Assuming the headset is not so cheap that the cups or races are actually warped, some frame and fork machining are in order. At this point, it probably will be necessary to enlist the aid of a competent cyclery and its attendant mechanic.

Two tools are necessary for fork and frame machining: a form crown race cutter and head tube mill. The former insures that the crown race will seat perpendicular to the steering tube. After grinding away bits and pieces of your butted tubing, you will have repaired your bicycle so that it will steer smoothly and more responsively. If a "notched" feeling can be sensed while turning the forks, then the headset needs to be overhauled or the bearings replaced. If, after you have disassembled and cleaned the headset, close inspection of the piece reveals pitted bearing races, you are on your way to a solution. Simple roughness should be curable by replacing the bearings and grease. In their worst form, pitted headsets must be discarded, but the following alternative procedure is worth a try. If the headset has contained loose balls, try using balls fitted in a retainer. If the bearings were caged, try using loose balls. Use two less than the space will allow with the same number of balls top and bottom. One notable exception to this rule is the Schwinn headset which uses larger bottom bearings than top. Campagnolo, of course, uses these larger bearings on top and bottom. Zeus and Dura-Ace have now copied Campagnolo in this regard with good success.

Even the best headset will operate poorly if it is full of road grit, and the easiest way to reduce this contaminaiton is through the use of fenders. Certainly less time is involved when using fenders than with frequent headset overhauls, not to mention the cost of replacing an expensive part. In addition, the rear fender is useful for keeping the brake and seat bottom fairly clean.

Student Handout: Bicycle Racing



Bicycle racing can be divided into two major categories: track racing and road racing. Time trialing is one aspect of road racing which involves riding alone against the clock on courses of varying length (usually 10, 25, 50, or 100 miles). In time trials, riders start separately, usually a minute apart, and ride alone. The winner is determined by the lowest time recorded. Time trialing requires the ability to pace oneself in order to maintain a constant high speed throughout the course. Often, much energy is wasted by sprinting then coasting and then sprinting again. Time trialing is the safest and easiest type of bicycle racing, so most novice racers start with time trials. In time trialing, each rider is riding against himself, always trying to improve his time.

Road racing involves massed starts and long distance racing over planned courses which may include a variety of road conditions. In a road race, an area of streets usually less than two miles may be blocked off so riders can circle an area a desired number of times for distances of 10, 25, 50, or 100 miles. This kind of circuit around several city blocks is called criterium racing and is especially popular since spectators can see the riders so many times. In another form of road racing, a course may be spread out over many miles, such as the several thousand mile Tour de France. In all types of road racing, the racer must be aware of both the road conditions and the strength of his opponents.

Track racing involves not only pacing and stamina, but also strategy and acceleration. In this type of racing, riders all start together although only a small number of cyclists can participate in any one heat. Riders circle on the high banked track, maneuvering for position and trying to break into their final sprint. To begin the sprint, a rider suddenly races to the inside of the track, trying to get and hold the lead. The other racers race after him/her, trying to out maneuver and out sprint each other. The split second decisions and moves that occur in track racing often result in chain reaction accidents.

Bicycle racing demands certain modifications of the familiar "ten-speed." The frame for racing bikes is usually made of steel alloy tubes. For racing, a rigid frame is desirable; therefore, racing bike frames are built as upright as possible. All racers use tubular tires which, although very expensive, deliver superior performance. A minimum price for a good racing bike is about $600. This figure does not include the cost of the spare tires and parts.

The most important skill for a racer to learn is that of "riding a wheel." To "ride a wheel," a racer rides close enough behind another rider to be pulled along. A racer's front wheel must be less than a foot from another's rear wheel. Obviously, this is a difficult technique to learn, and one which, when performed incorrectly, is responsible for many accidents.

I. Class IX

1. Ride - Time Trials

Set up a course for time trialing. The course should be flat and straight with no stop signs or railroad tracks and as few crossing roads as possible. The course should be relatively short (perhaps 10 miles). You should enlist someone's aid to serve as timekeeper at the end of the course.

Go over the route carefully with students. Point out any difficult or dangerous spots in the route. Give them each a starting number. Usually the slower riders start first to shorten the race time. Explain that you will start them at one minute intervals and that they are to proceed at their own pace to the end. Remind them to try to go at a constant pace throughout the course. Caution them to obey all traffic laws.

When everyone is ready, start first rider. One minute later, start the next. Stopwatch should be started at time first rider starts. When all riders have started, ride the course to the end making sure that all riders are all right.

At the end of the course, timekeeper will calculate each rider's time by subtracting starting time from ending time. Put times in order. Get the group together and announce the best time. Answer any questions the group has about time trials. Ask them if they went too fast or too slow. Ask students if they had energy left at the end.

Take a slow ride back to the classroom.

2. Bottom Bracket

Demonstrate bottom bracket adjustment. Show how to grease bottom bracket bearings and explain that this should be done yearly. If students are still having problems after bottom bracket adjustment, suggest taking bike to a mechanic.

3. Bike Facilities

Controversy over separate bike lanes and bike paths is raging among many cyclists. Present pros and cons of separate bike facilities. Examine

any bike facilities which exist in your area and evaluate them. Have students suggest possible improvements.

4. Bicycle Carriers

Discuss ways to transport bicycles including auto-mounted carriers, package express on buses, shipping by railroad, or personal baggage on airplanes. Describe proper way to prepare bicycle for shipping so that it will be protected as much as possible.

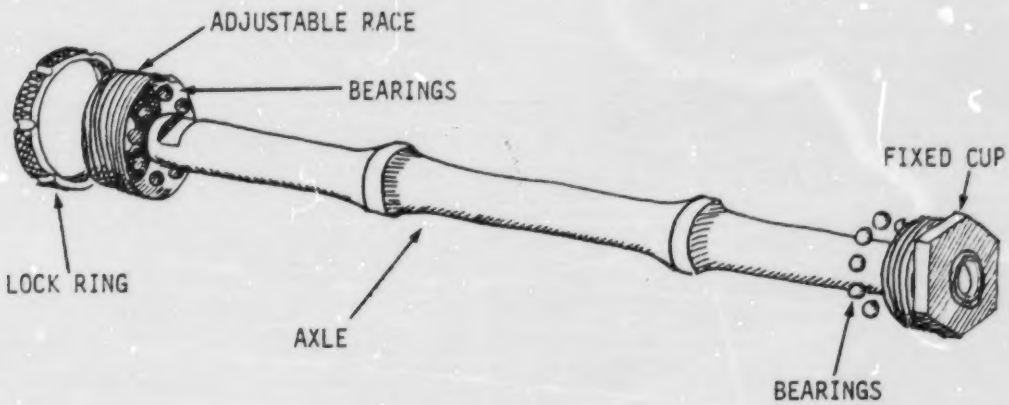
5. Dogs and the Cyclist

Discuss dogs as a potential danger to cyclists. Hand out pages 111-112.

Student Handout: Bottom Bracket

Except for ashtabula cranks, a cotter pin or a bolt (cotterless cranks) holds the cranks on the bottom bracket axle. The parts of the bottom bracket include the axle, bearings, a fixed and an adjustable bearing cup, and a lockring for the adjustable bearing.

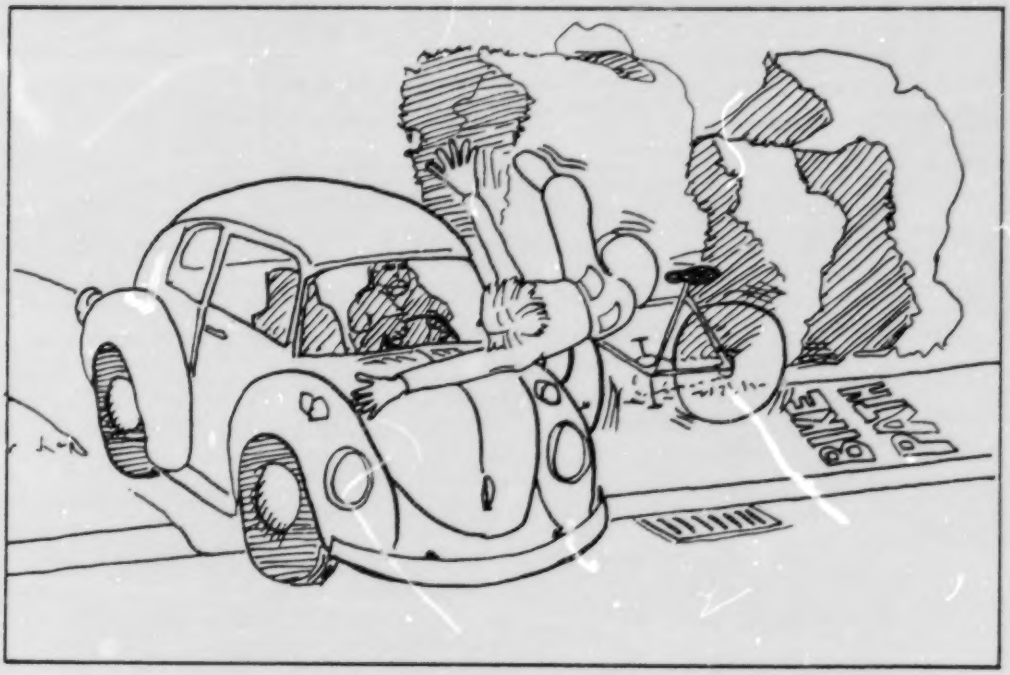
Bottom bracket adjustment is quite similar to headset adjustment; loosen the lockring, adjust the adjustable cup and tighten the lockring. The lockring may have notches and can be loosened/tightened by placing a flat screwdriver in one of the notches and tapping the screwdriver with a small hammer.



Student Handout: Bike Facilities

Bicycle facilities, such as bikeways, have become increasingly controversial over the last few years. Bicycle experts cite the hazardous conditions bikeways impose on the cyclist while motorists are trying to get the cyclists off the roads. Here are a few of the arguments against the bikeway.

1. Bikelanes require more skill by the bicyclist than do normal roads. Also, riding on the sidepaths requires bicyclists to be extremely careful of cars entering from every driveway and intersection. Thus, sidepaths put the pressure on the cyclist to be a car dodger.

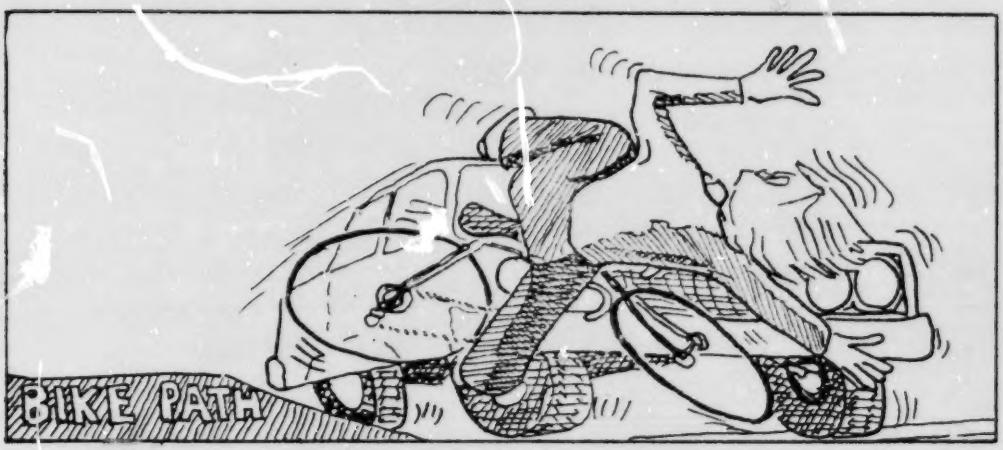


2. Although bikelanes and sidepaths are an attempt to reduce car/bike collision, they actually increase the possibility of accidents. About 95 percent of car/bike collisions are caused by turning and crossing movements. Bikeways increase crossing difficulty 50 percent of the time and do not reduce the rest.

3. Bikelanes and sidepaths are not the best way to attract new cyclists. Although many cyclists are afraid to ride on the road-

way, the dangers of learning on a bikelane or sidepath might alienate future cyclists.

4. Bikelanes provide poor training for the new cyclists. On bikeways untrained cyclists are taught to ride at the side of the road, to get tangled with tight turning cars, and to turn left from the curb lane. In addition, sidepaths teach cyclists to dart out from curb ramps. Accidents resulting from turning or entering the street from curb ramps account for approximately one-third of those accidents experienced by bicyclists.



5. Many motorists cite the incompetent or inexperienced bicyclist as an excuse to get all bicyclists off the roadway. Instead, there should be ways to educate cyclists and motorists. This course is one attempt to educate cyclists.

Arguments for the bikeway are:

1. The separated "Greenway" type of bike path is very beneficial for recreational and even some commuter riding depending upon the time of day. Also in some cases where traffic volume and speeds are very high, such a path can be quite a relief to the cyclist.
2. Sidepaths can be valuable if all dangerous aspects are foreseen and properly designed for. They are a safer place for kids to ride in urbanized areas and around lower grade schools. However, instruction on how to ride them is necessary.
3. Bike lanes, if located and designed properly, can be used successfully on high-speed streets. Again, however, instruction on how to ride them through intersections is extermely important.

In fact, teaching people how to ride a bicycle in all situations on or off the roadway is perhaps the most important aspect of bicycle transportation. After all, motorists had to learn to drive cars, too.

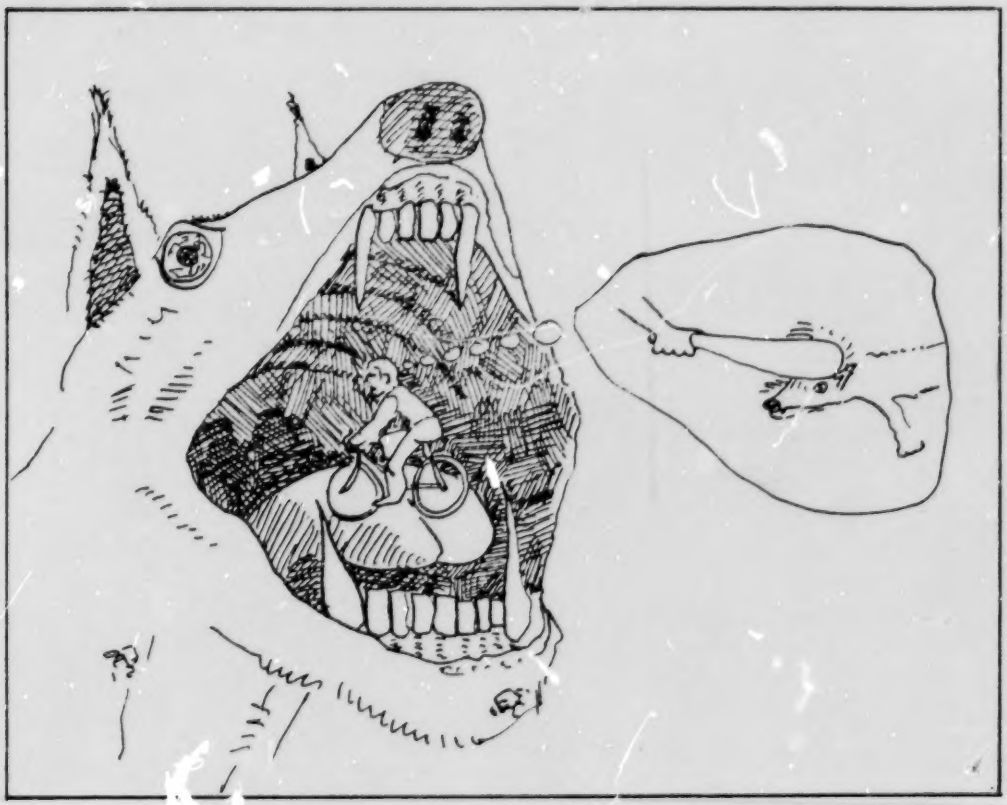
Student Handout: Bicycle Carriers

Although bicycles can be dismantled, carriers provide the best means to transport a bicycle. Bicycle carriers are usually top or rear mounted on the top of the roof or mounted on the trunk or rear bumper. If you plan to travel by bus, some buslines such as Greyhound accept bicycles as a package express. The bicycle must be packed in a carton, for which the maximum length for transport within a state is 84 inches. Amtrak ships bicycles for a $3-$5 handling charge. Bike cartons (from Amtrak) are also available in major cities in this country. Many airlines accept bicycles as personal baggage, though they often assess an additional charge. United Airlines provides a bicycle box, but the handlebars and pedals must be removed and the seat must be lowered or removed. American Airlines provides a polysack which must be fitted around the bicycle. Eastern and Western Airlines accept bicycles sent in a carton with the pedals removed and the handlebars turned. Delta prefers that you provide a carton and give advance notice.

In Europe, where bicycling is more common among the populace, many countries have bike racks on trains. If you are planning a trip in Europe, check the individual country or train system to see if this service is provided.

Student Handout: Dogs and the Cyclist

Source: "Busting Bow-Wow" by Charlotte Vogt, in Cyclateral Thinking (n.p., n.d.), n.p.



Survival Tactics

1. As soon as you spot him, watch the dog's ears and tail. Upright ears and tail means just curious--a friendly hello as you ride by will reassure him.

   Upright ears and tail held low means a seasoned chaser--he might be surprised by a sharp "NO!"

   Flattened ears and low tail means a sneak attack--he will go for your heels from behind.

2. Stay on your bike if at all possible--don't kick or strike at the dog, but do try to bluff him with your voice. However, a pump pointed toward a chasing dog is useful for fending him off in a situation where the rider doesn't need to concentrate fully on the road. Only a gentle tap on his nose is needed. No wild unbalancing swings are necessary.

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3. If you are hard-pressed or actually attacked, dismount rapidly on the opposite side of the bike and keep your bike between you and your attacker.

   If the dog can be intimidated, stare at him and roughly order him away. Do not attempt to walk away until he backs down.

   If the dog gets increasingly aggressive, avert your eyes and try a gentler, calming tone. Staring is an act of aggression.

4. Be aware of the moment-to-moment changes in the stand-off. Be aggressive and take advantages of any signs of timidity. Above all, be optimistic: do not assume you will be bitten. Dogs are very conscious of "body language" and will pick up on fear or hesitancy.

5. Don't worry too much about rabies, in the U.S. and Canada, at least. A dog's bite hurts, but not as much as you'd expect, and if you must be bitten, better a dog's relatively clean mouth than his owner's!

6. Read up on dog behavior, and learn what to expect. An excellent source that is fun to read is Man Meets Dog, by Konrad Lorenz.

   A more technical, but highly informative, book is Dog Behavior by Michael Fox.

7. Be aware that at night a dog can approach you silently without being seen and scare the bicyclist, especially in the first few seconds when you are trying to see him.

8. The main danger is the dog that darts in front of the bike and is hit. This sends the cyclist over the handlebars, a very serious accident. The dog which chases from behind or runs alongside does not pose this problem. Thus, the dog which can be fended off is relatively harmless, but the dog which appears without warning and cannot be warded off is more dangerous. Another major problem is the confusion and subsequent cyclist-cyclist collisions a dog causes when he runs into a pack of riders. These two problems cannot be prevented, but slowing down where dogs are known to be and caution about riding in close groups in such areas will help.

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J. Class X

Class X has been left open to allow individual instructors or classes to spend some time on topics of particular interest or to catch up or review. A suggested use for the tenth class would be to take an all-day ride using a route designed by the class or using a segment of the Department of Transportation's Cross-North Carolina route. Other classes may be more interested in racing, in other aspects of maintenance, or in repeating the bike rodeo to assess individual improvement.

Since this will be the last class meeting, you may wish to make some final evaluative comments to some or all of your students. Since the course is intended to improve the skills of students, we do not suggest any kind of grading. However, commenting on areas in which students have made great improvement and on areas in which they need more practice will be valuable to the students.

Also, you may wish to have the students evaluate the course content and your instruction. The Department of Transportation would be most interested in any comments concerning the course content which would be relevant in future versions of this course or future courses. Please address these comments to:

Bicycle Coordinator
N.C. Department of Transportation
Post Office Box 25201
Raleigh, North Carolina 27611

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Appendix A - Bicycle Clubs and Organizations

1. League of American Wheelmen
   19 S. Bothwell
   Palatine, Illinois
   L.A.W. focuses on touring. Membership is open to everyone.

2. International Bicycle Touring Society
   846 Prospect Street
   LaJolla, California 92037
   This club will help plan rides anywhere.

3. American Youth Hostels
   National Campus
   Delaplane, Virginia 22025
   Stresses travel and sightseeing by bicycle. Membership allows you to stay overnight at youth hostels for a small fee.

4. Friends for Bikecology
   Ken Kolsbun, Executive Director
   1035 E. DeLaGuerra Street
   Santa Barbara, California 93103
   An active organization in national bike politics. Focuses on national improvement through action at local level.

5. The U.S. Cycling Federation
   P.O. Box 669
   Wall Street Station
   New York, New York 10005
   Has information on comparative and olympic racing.

Appendix B - Active North Carolina Bike Clubs

1. Brian F. Jacobs
   Davidson Cycle Co-op
   Box 4017
   Davidson, N.C. 28036

2. Tarheel Cyclists
   P.O. Box 4392
   Charlotte, N.C. 28204

3. Vance Senior High School Bike Club
   c/o M. E. Yount
   Route 6, Box 285
   Henderson, N.C. 27536

4. Hearts Racing Club
   c/o Linda P. Shore
   7935 Curtina Lane
   Lewisville, N.C. 27023

5. Piedmont Pedalers
   c/o Our House
   4403 Country Club Road
   Winston-Salem, N.C. 27104

6. Triad Wheelers
   P.O. Box 9812
   Greensboro, N.C. 27408

7. Asheville Bicycle Club
   c/o Mike and Claudia Nix
   72 Sherwood Drive
   Asheville, N.C. 28803

8. Cross Creek Cyclists
   P.O. Box 5332
   Fayetteville, N.C. 28303

9. Carolina Velo Club
   c/o Bob Miller
   2421 Ferguson Road
   Raleigh, N.C. 27612

10. Cape Fear Cyclists
    P.O. Box 3003
    Wilmington, N.C. 28403

11. N.C. State Bicycle Club
    c/o George Underwood
    5712 Winthrop Drive
    Raleigh, N.C. 27612

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Appendix C - Cities with Bicycle Facilities

Separate Facility, Built or *Planned

Greensboro
Raleigh
Charlotte
Ft. Bragg
*Wilmington

Striped Lane

Raleigh
Greenville
Wilmington

Bike Route Signing

Winston-Salem
Burlington
Morganton
Elizabeth City
Fayetteville
Raleigh

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Class I

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